Commercial Fisheries Abstracts

a monthly summary of important developments for the fishery industries

In this issue—

- Bulbous Bow Trawlers P.
- The Norwegian Jigger P. 3
- Self-Dumping Deck P. 5
- Safety of Food Additives P. 9
- Frozen Tuna Sampler P. 17

—and 35 others

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Commercial Fisheries Abstracts

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Following is a brief outline of this filing system. The numbers apply to the first digit appearing on each card. For the meaning of subsequent digits, please see the above described leaflet.

0	General and theoretical	5	Vitamins
1	Fish by species	6	Fishery byproducts
2	Fresh fish	7	Analytical Methods
3	Preserved fish	8	Composition
4	Oils	9	Miscellaneous

Use of funds for printing this publication has been approved by the Director of the Bureau of the Budget November 23, 1956.

0.321 EXTRACTABILITY OF MYOSIN AND ACTIN FROM FISH

Connell, J. J. (Torry Research Sta., Aberdeen, Scot.)
Congr. intern. biochim., Resumes communs., 3e Congr., Brussels 80 (1955)
Chemical Abstracts 51, 7596 (May 25, 1957)

Owing to differences in the kind and amts. of stroma, it is more difficult to prevent the simultaneous extn. of actin when myosin is extd. from carp or cod muscle than with rabbit or frog muscle. With the skeletal muscle of cod (Gadus callarias), lemon sole (Pleuronectes microcephalus), skate (Raja batis), and dogfish (Scylliorhinus caniculus) there is a parallel between the rate of extn. of actin from minced muscle (measured by the adenosinetriphosphate (I) sensitivity of exts. taken at different times) and the amt. of stroma in the muscle. Extn. is most rapid with cod (with the least stroma) and least rapid with dogfish (with the most stroma). The levels of I in the muscle is evidently not a factor, since the amts. of I detd. are not significantly low; 2.3-2.4, 1.8-2.3, and 1.3-1.7 micromoles I per g. muscle for cod, lemon sole, and skate, resp.

Reprinted in whole

2.1121 ASSEMBLY METHODS FOR OTTER-TRAWL NETS

Knake, Boris O. (Fishing and Gear Research, East Boston, Massachusetts)
Fishery Leaflet 437, 29 pp. (December 1956) U. S. Fish and Wildlife Service, Washington, D. C.

The otter-trawl net is a device for catching bottom fish. It is constructed of twine webbing, so that when fully assembled and rigged it will take the shape of a huge funnel while traveling along the bottom of the ocean.

Efficient fishing performance of the trawl net is contingent upon proper and precise assembly of web sections and net rigging. Correctly rigged, the trawl doors keep the mouth of the net open by operating at an outward angle that varies between 30° and 40° from the direction of the towed trawl. If a trawl net is improperly assembled, the twine in the net webbing will be subjected to uneven strain and will break.

There are many standard nets in use by the United States trawler fleets and, when requested, commercial net dealers will supply specification charts with the type of net ordered. Most of these nets are made of cotton or manila, although the use of synthetic fibers in cod ends recently has become common practice.

The Iceland trawl net, which is used extensively in the North Atlantic, is illustrated along with a series of diagrams of the various types of representative otter trawls. This publication describes in detail the design and proper methods for assembling the Iceland trawl net, although most of the procedures are applicable also to other types of trawl nets.

The primary parts of an Iceland trawl are: top wings, lower wings, square, belly and cod end.

(over)

ABSTRACTER: Richard L. McNeely

2.111 ALL ABOUT NYLON NETS

Starr, Robert J.
Southern Fisherman 17, 90, 105-106 (June 1957)

Nylon, a synthetic fiber, was introduced in the late 1930's, but its development was temporarily halted during the war years. The greater strength, longer life, lighter weight, and minimal care requirements of nylon are responsible for its popularity. Gill nets of nylon webbing are particularly successful because the smooth hard fibers result in a sharpness that make the nets 50 to 100 percent more efficient than those of cotton and linen. Its greater strength and longer life make nylon desirable for expensive purse seines.

Nylon nets last 2 to 8 times longer than those made of cotton or linen and its wet-knotted strength is about 2¼ times greater than equal sizes of cotton. Nylon also differs from cotton and linen in that it is sensitive to the phenolic acid in creosote and other tars; it is damaged by sunlight and excessive bleaching; it stretches more--both under tension and merely hanging in the water; it shrinks only 5 to 8 percent in boiling water; it absorbs very little water; and it requires no drying, salting or net preservatives to prolong its life.

Nylon is available in a variety of sizes and twists, and may or may not be spun or bonded. In general, nylon is replacing almost 100 percent of the smaller mesh sizes formerly made with cotton and is being used more and more for larger mesh netting.

The higher original cost of nylon netting is usually more than compensated for by its longer life, strength, and inexpensive care.

(over)

ABSTRACTER: Richard L. McNeely

2.1121 THE GRANTON TRAWL (3): THE ROPE WORKING GEAR

Garner, John
World Fishing 6, 46-47, 49 (June 1957)

The working gear that is attached to the trawl to make it workable is both extensive and expensive. Several different types of working gear are used for deep-sea fishing. The most popular type is dealt with in this article.

The headline is the first part of the working gear to be fixed. It consists of a 4-inch circumference manila rope, 78 to 80 feet in length, with a thimble-eye spliced in each end and a mark (quarter mark) made with twine 29½ feet from each end of the rope.

The headline is attached across the top of the mouth of the trawl in the following manner: The stapling opposite the last flymesh at the top wingend is located and the part of the bolch holding the stapling is seized onto one eye of the headline. This is repeated at the other wingend and then each quarter mark is seized onto the appropriate quarter--at the position on the bolch opposite to where the stapling passes through the first flymesh and headline mesh at each corner. There are now three large bights of bolch along the headline, and these are cut down into small bights by seizing the bolch on the headline every third stapling.

The second part of the working gear consists of seven fishing lines--three 20 feet in length and four 14½ feet in length, which is inclusive of an eye splice at each end. All of these lines are made of 2¼-inch circumference combination rope, and are joined on the lower half of the mouth of the trawl.

The advantages of having several fishing lines in preference to one large one--118 feet in

(over)

ABSTRACTER: Kathryn L. Osterhaug

MYOSIN AND ACTIN FROM FISH

NYLON FOR NETS

ASSEMBLY OF TRAWL NETS

THE GRANTON TRAWL

2.111

Dacron, another synthetic is similar to nylon but has slightly less strength. It is resistant to sunlight and has a greater density than nylon, making it more desirable for purse seines where sinking speed is important. Many other new fibers are constantly being developed, but, as yet, nothing compares to nylon's adaptability and acceptance by the fishing industry.

2.1121

length--are many.

As the fishing lines are placed on the lower half of the mouth of the trawl, they are subject to much wear and tear and are very liable to break. It is far simpler to strip a short line and replace it than to repair a 118 foot line each time a break occurs. The small fishing lines are also essential for fixing onto the rest of the working gear.

When all of the seven fishing lines have been seized onto the trawl, the ajoining fishing line eyes are secured together with a small shackle or a hemp seizing. See figure 2, below.

A wing line is fixed at each end of the trawl. One eye of the wing line is secured to the thimble eye of the headline with a good seizing of hemp, and the other eye is seized onto the last eye of the wingend fishing line in a similar manner. The wingend meshes of the top and lower wings must now be joined to the bolch, which in turn must be secured with sittings onto the wing line, in a pattern similar to the fishing lines.

The completion of the wing lines means that the mouth of the trawl has been strengthened for a second time and is now ready for the wire rope working gear.

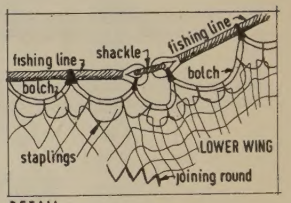

Figure 2, Showing (inset) enlargement of the lower belly.

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The net sections usually come in six bundles to a net. They are joined by weaving and lacing. The jam or stop hitch is used during lacing operations. It is customary to check the mesh count of the various sections before assembly is started as a section containing fewer or more meshes than stated will cause misalignment of the net.

Assembling is started by lacing the two belly halves together. After joining the belly halves, the square section is attached to the top belly half by weaving with double manila twine. The top wings are then woven to the square. The lower wings are joined to the lower belly and then the cod ends, which are woven in halves, are laced together at the outer edges, and attached to the trawl net by weaving one end to the belly of the net webbing. The lower webbing is not hung directly to the footrope, but is first attached to a special line known as the hanging line or bolch line. To complete the assembly, the trawl net must be properly hung and bent onto the supporting frame--consisting of the headrope, footrope, belly lines--and finishing by securing the wing or door ends.

Floats for otter-trawl nets are usually made of glass, steel or aluminum alloy. The number of floats on a trawl net varies depending on the size of net and the species of fish wanted.

A splitting strap is fastened about 21 to 35 meshes up from the cod end. This allows up to 4,000 pounds of fish to the lift.

2.1121 THE GRANTON TRAWL (4): ROPE WORKING GEAR FOR THE COD ENDS

Garner, John
World Fishing 6, 32-34 (July 1957)

A previous article has described how the cod ends of the trawl are protected against wear and tear from the sea-bed with a covering of false bellies and hides. The cod ends must next be prepared to do their job.

The double bag becket is about 8 feet long (double), made of 4-inch circumference combination rope, with a hauling leg attached that is from 14 to 16 feet in length and made of wire rope. There are two types of double bag becket. With the first, the two ends of the combination are spliced onto a metal ring and the hauling leg is also spliced onto the metal ring, whereas with the other type, the two ends are short-spliced and the hauling leg is joined onto the becket with an eye splice. A good seizing is then put on to secure the eye splice and keep the hauling leg in a permanent position.

Two small grommets are used to fix the doubling becket onto the cod ends. Two strips of old cod end pieces are cut to 7 meshes wide by 12 meshes deep (these are known as the back strops) and two larger strips 10 meshes deep and the full width of the cod ends from selvedge to selvedge (one becoming the funnel and the other the chafing piece).

The doubling becket is fixed onto the cod ends as follows: six feet from the cod end on the selvedge the meshes are traced across to the opposite selvedge and marked on both selvedges. One eye of each of the two grommets is seized (preferably with Italian hemp) onto each selvedge where marked. The cod ends are now pulled through the combination becket, or the becket is enclosed around the cod ends, and moved to the level of the two grommets. The hauling leg must be joined to the becket at the top side of the cod ends.

The "belly side" of the cod end is protected from chafe on the becket by a portion of old net running the full width of the cod end. The becket, in turn, is protected and located by the "funnel",

(over)

 ABSTRACTER: Kathryn L. Osterhaug

2.113 OUTWITTING THE MARINE BORER

Anonymous
Chemical and Engineering News 35, 90 (July 8, 1957)

Introduction.--Wooden structures, piling, and logs in contact with sea water are subject to enormous damage annually from the teredo or shipworm. This includes both the true teredo (Teredo navalis), which is common to the coastal waters of the United States and its relative, Bankia setacea, which is common to the Pacific Coast of the United States and Canada. These two borers destroy over one million dollars worth of saw and pulp logs annually in British Columbia alone and are very difficult to control.

Nature of problem.--Recently, the British Columbia Research Council in Vancouver found a chemical, sodium arsenite, that can be applied or sprayed economically on log rafts before their sea voyage to give a 100 percent kill of marine borers. Heretofore, the problem of control was complicated by the characteristics and life cycle of the borer.

Borer characteristics.--A marine borer starts out as free-swimming larva, attaches itself to submerged wood, and starts to bore a tunnel in which it will remain for the rest of its life. As the borer, or adult shipworm grows, it enlarges its tunnel. Because it is wormlike with a soft body it can grow to a length of 2 feet. On its head are two clam-like shells that are used mechanically to bore through the wood. On its tail are two feather-like calcareous structures called pallets plus two siphons which usually stay outside of the tunnel. The longer of the two siphons draws in sea water, which contains oxygen and planktonic food for sustaining life; whereas the shorter siphon excretes partially digested wood which appears as piles of white material. Both the plankton and the wood appear to be necessary for the maintenance and growth of the shipworm. If the shipworm is disturbed it will retract its siphons and plug its tunnel.

(over)

 ABSTRACTER: Martin Heerdt

2.1123 THE "NORWEGIAN JIGGER"

Anonymous
Trade News 10, 6 (July 1957)

The "Norwegian Jigger" is being used very effectively to handline cod and pollock along much of the outer coast of Nova Scotia. No other piece of equipment introduced in recent years has had such immediate acceptance. This lure (called the Swedish jigger in Norway) is used by all handliners at Lofoten.

Briefly described, the Norwegian jigger is a shiny, curved, triangular piece of metal about 11 inches long with three hooks at the end. Attached by short gangings to the handline above the jigger, at about one fathom intervals, are several lured hooks. The lures used in Norway are pieces of red and green plastic tubing. No bait is used on any of the hooks. Monofilament nylon (about 1.5 mm. thick) is used for the handline and it is claimed that monofilament lines increase the effectiveness of the lure. The Norwegians also use a small hand reel to haul the line. It is believed, that a handline reel would facilitate hauling, particularly for monofilament nylon lines.

It would seem logical to introduce the Norwegian jigger into other areas where handlining for cod is carried on extensively. Increased catches and decreased bait costs or some combinations of both should result in increased profit to handline fishermen.

See illustration, over.

(over)

 ABSTRACTER: Kathryn L. Osterhaug

2.115 PIONEERING USE OF THE BULBOUS BOW IN TRAWLERS

Anonymous
The Fishing News (England) No. 2303, 3 (June 7, 1957)

Few phases in the search for better trawler hulls has excited more attention than the development of the bulbous bow forms.

The average speed of deep-sea trawlers is increasing, and loaded speeds up to 15 knots are anticipated. Therefore, the attention of trawler architects is directed to the study of seakindliness and the reduction of hull resistance. This means more speed without increasing operating costs.

What are the advantages of the bulbous bow? Roughly, by transferring displacement from about the waterline to a less "resistful" position at and above the keel level, the resistance of ships having a speed to length ratio of V/L = 0.8/1.0, the resistance of the hull can be decreased by some 10 to 15 percent. The accompanying illustration shows what is meant by the transfer of displacement from the waterline to a less resistful position. The diagram is drawn for a trawler of 185-foot length between perpendiculars. Deep-sea trawlers fall into the described category of speed to length ratio and, in the continual search for increased speed with utmost fuel economy it is logical that the bulbous bow would be tried out on this type of vessel.

Two British trawlers with this design feature were constructed in 1956. The vessels have a registered length of 188½ feet with 32½ feet moulded breadth and 17½ feet moulded depth. The gross tonnage is about 800 and the main machinery consists of a triple expansion engine developing about 1400 i.h.p. at 132 r.p.m. on loaded trials.

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 ABSTRACTER: Kathryn L. Osterhaug

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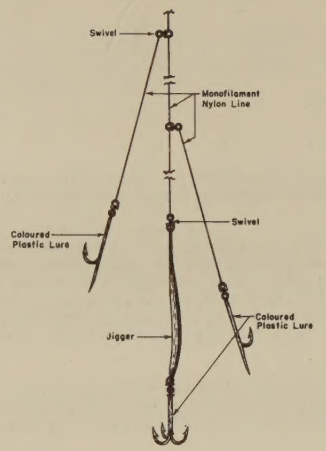
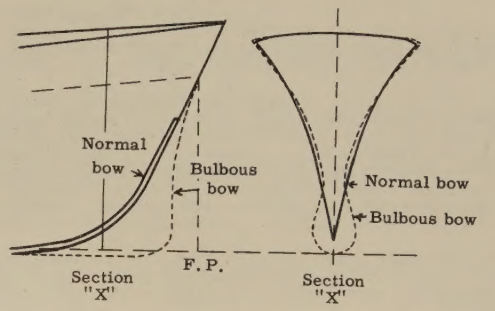
NORWEGIAN JIGGER

Right side view - rigged for action.



2.115

In sea trials, the vessels fulfilled the performance predictions from the model experiments and attained a speed just short of 14 knots. Subsequent successful voyages reportedly gave results fully justifying the confidence placed in the ships' capabilities.

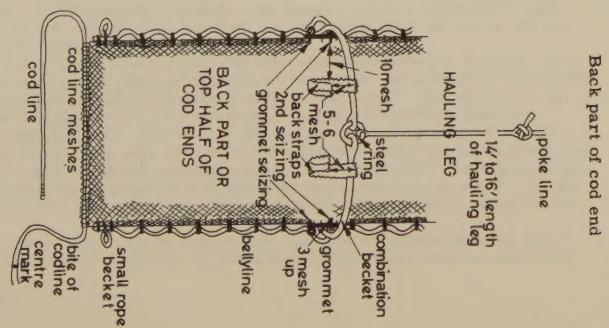


This comparison of bows shows what is meant by the transfer of displacement from about the waterline to the less resistful position.

2.1121

a piece of net 20 meshes short of the width of the cod end that passes over the becket and is fixed top and bottom.

The principle on which the double bag becket works is that once the cod ends are full of fish, the hauling leg is heaved upon and the combination becket, acting through the grommets, draws the two selvedges together and closes the net. This creates a "bag of fish" which, after it has been hoisted aboard the boat is opened by releasing the cod line. After the fish have been released onto the deck, the cod line is retied and the combination becket is rendered through the grommets to ensure that the double bag becket is clear for the next bag.



2.113 (Cross Reference: 2.1124)

Control.--For control, a 100 percent kill is required since even a few live shipworms can greatly reduce the value of a log. To obtain control, some 115 compounds both organic and inorganic were screened to find the right one. A few gave a partial kill at low concentrations. Sodium arsenite, however, gave a complete kill over a concentration range of 25 to 10,000 parts per million (p.p.m.).

Treatment.--To treat logs, a concentrated sodium arsenite solution is drawn through a pump, mixed with sea water and sprayed over a Davis type of log raft with a fire hose. This type of raft ranges up to 400 feet long, 80 feet wide, and 18 feet thick. It draws 8 to 12 feet of water, is worth up to $80,000 and can be damaged to the extent of $10,000 by shipworms. A 0.5 percent solution is applied to give 55 p.p.m. of sodium arsenite around the logs. At this concentration the solution is slightly denser than sea water and diffuses slowly downward through the raft with sufficient contact, twice on each log, to obtain 100 percent kill at a cost of about $500 per raft. Flat rafts only one log thick can be effectively treated with an ordinary irrigation sprinkler system that spray a dilute sea water solution of sodium arsenite over the logs for 4 to 5 hours at a cost of $200 to $300 per raft as compared with a raft value of $6,000 to $25,000.

2.114 DUMPING DECK USED TO CHUTE TRASH OVERBOARD ON SCALLOPER, DARTMOUTH

Anonymous
National Fisherman 38, 17 (July 1957)

A specially constructed section of the deck of the 93-foot New Bedford scalloper, Dartmouth, can be raised hydraulically for dumping trash back into the sea.

The captain of the Dartmouth claims that the hydraulic deck shortens the time at sea and makes more full trips possible. The device saves the work of shoveling overboard the debris brought up in the drags, and gives crew members more time for shucking and packing. It is most efficient when fishing on heavy trash bottoms.

Arrangements in the pilot house are convenient. Separate valves operate the port and starboard sides of the deck. When the deck raises, 16 feet of the side rails open at the same time and the up-raised deck dumps its trash through the open rails. The raised false deck takes the place of the rail to prevent heavy seas from piling aboard.

In the hold at the centers of both the port and starboard sides of the deck is a 6-inch hydraulic cylinder with a 30-inch stroke. Each cylinder is hung on pinions so that the thrust is direct at all times. The two cylinders are connected by flexible hose to brass pipe running to the pressure tank in the engine room.

Power from the vessel's 180 h.p. diesel engine is supplied by pulley take-off from the main shaft. The clutch is controlled from the pilot house. At the time the clutch engages the pump, a switch is thrown that lights 4 red lights, 2 forward and 2 aft on the hydraulic deck, in order to warn

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 ABSTRACTER: Kathryn L. Osterhaug

2.118 SIGNIFICANCE OF THE GERMAN FACTORYSHIP

Hardy, A. C.
The Fishing News (England) No. 2308, 8-9 (July 12, 1957)

Because the German fish factoryship, Heinrich Meins, is such an unorthodox fishing vessel, it is of interest to consider her present and future place in respect to world fishing. Her originality neither lies in the fact that she has a stern-chute, nor in the fact that she fishes over the stern, as opposed to the quarter, nor to her employment as a self-contained fish factory.

The Heinrich Meins is noteworthy because of the type of machinery she carries, her method of propulsion, and her method of control. This vessel, with an overall length of 220 feet, a waterline length of 230 feet, and a beam of 33 feet, has twin-screw cycloidal propellers, each driven by a four-cycle, turbo-charged diesel by means of reduction gearing and shaft. The engines are uni-rotational and, once the ship is "full away" and takes the normal rated output, there is no need to alter engine speed as the speed and direction of the vessel are controlled by means of the blade angle in the cycloidal propellers that are controlled from the bridge.

This is the first ship to have its complete engine room far forward of amidships, with no propeller, and no rudders, no stern gear, and therefore no possibility of fouling the stern gear with the warps, and the cycloidal propellers at the forward end protected by skegs.

The fishroom below the factory deck is virtually amidships at the widest and best part of the ship. The propelling machinery is relegated to the place where all propelling machinery rightly belongs--where no revenue earnings is possible.

(over)

 ABSTRACTER: Kathryn L. Osterhaug

2.119 AVOIDANCE OF COLLISION AT SEA (AND IN THE AIR)

Wylie, F. J.
Nature 180, 213-214 (August 3, 1957)

A joint meeting of the Institute of Navigation, l'Institut Francais de Navigation, and the Ausschuss für Funkortung was held at the rooms of the Royal Geographical Society during June 5 to 7, 1957, on "The Avoidance of Collision by Airborne and Shipborne Means".

Collisions at sea.--At this meeting, after a disquisition on the mathematics of collision avoidance, the following items regarding collision at sea were considered: (1) the causes of collision at sea despite the use of radar; (2) the possibilities of avoidance by maneuver; and (3) the contribution which electronic or other equipment may make, or be asked to make to ease the task of the navigator in this regard. Fog or low visibility was assumed throughout.

The main failure to avoid collision in the radar-fitted ships seemed to be philosphical or psychological rather than technical, in the navigational or electronic senses; inability to understand that the danger mounts at an increasing rate as ships approach one another without reducing speed; failure to appreciate the importance of continuity of radar watching and forming the habits of regular and precise observation. The view was unanimous that better training was essential and that is should include instruction in these non-technical aspects. There was no dispute concerning the need for seamanlike caution when interpreting the rule calling for moderate speed, or for progressive reduction of speed when approaching a close-quarter encounter. Of the 28 ships involved in collisions analyzed by one speaker, 20 were found by courts or inquiries to have been going too fast, and several maintained their speed up to the point of collision.

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 ABSTRACTER: Edward A. Schaefers

2.12 NORTH PACIFIC ALBACORE TUNA EXPLORATION BY THE M/V JOHN N. COBB--1956

Powell, Donald E. (Exploratory Fishing and Gear Development Section, U. S. Fish and Wildlife Service, Seattle 2, Washington)
Commercial Fisheries Review 19, 1-2 (June 1957)

Exploration to determine the distribution and availability of albacore tuna in a section of the northeastern Pacific Ocean from northern California to southern British Columbia was carried out aboard the U. S. Fish and Wildlife Service's exploratory fishing vessel John N. Cobb during the summer of 1956. Off-shore fishing was conducted over a seven-week period, from July 16 to August 30, extending out more than 800 miles off the coasts of Oregon and Washington.

The work was coordinated with simultaneous cruises of several other research vessels. The University of Washington's oceanographic vessel Brown Bear, participating with the Oregon Fish Commission, operated closely with the John N. Cobb much of the time (Frolander and Lincoln 1956, and Homberg 1956). High-seas salmon research vessels covered the waters to the north and west of where the two vessels operated, and the John R. Manning from the Pacific Oceanic Fisheries Investigated in Hawaii conducted albacore research west of 145° W. longitude (Anonymous 1956). Oceanographic and biological data collected are currently being analyzed by agencies engaged in albacore and salmon research in this area.

Information obtained by the high-seas salmon research vessels in 1955 indicated that the southern limit of salmon distribution coincided roughly with the northern limit of albacore during the summer months. In the northeastern Pacific this dividing line, with some overlapping, appeared to lie between 45° N. and 50° N. latitude. It was found during those investigations that high-seas gill

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 ABSTRACTER: Kathryn L. Osterhaug

SELF-DUMPING DECK

THE HEINRICH MEINS

COLLISIONS AT SEA

ALBACORE EXPLORATION

2.118

The stern of the vessel is entirely clear and runs up in a curve from the lowermost point of the keel with a slight vertical deadwood to assist the ship's maneuvering. From photographs, it would appear that the ship has no superstructure other than that forward and centering above and around the engine casing. This means that two-thirds of the length of the ship is open deck with excellent facilities for discharging fish into the factory deck below, and from the factory deck into the deep-freeze hold.

There are four derricks, two forward and two abaft each of the derrick posts for handling nets, gear and fish. A skeleton bridge is constructed over the stern chute with voice-pipe connection and telegraphs to the main bridge.

The line of sheer of the weatherdeck stops at the fo'c'sle, and the fo'c'sle extends aft and contains the navigating bridge, the foremast, and the majority of accommodations within the ship.

The significance of this type of ship in the future of world fishing is discussed briefly but not conclusively.

2.12

nets designed to catch salmon were also effective in catching albacore. Accordingly, one of the John N. Cobb's 1956 objectives was to obtain further information on the northern distribution of albacore and the southern distribution of salmon between 40° N. and 50° N. latitude, from the Pacific Coast to 145° W. longitude, fishing with gill nets and albacore trolling gear.

Albacore tuna were found to be widely distributed off the coasts of Oregon and Washington during the summer of 1956. The first albacore were caught in a gill net set on July 20, and subsequent catches indicated that the albacore were scattered over a wide area, but no evidence of offshore schooling was found. Several salmon were taken in the gill nets along 50° N. latitude, but no albacore were taken north of 49° N. latitude.

Following the early albacore catches made by the John N. Cobb and the Brown Bear, several commercial fishing vessels began trolling near the Oregon coast in mid-August and immediately reported good catches of albacore. A fleet of over 100 vessels found good fishing all along the Oregon coast through September, and nearly 4 million pounds of albacore were landed in Oregon ports. This was the first year since 1950 that sizable catches of albacore were made north of California.

Table 3 - Surface-Water Temperature for Albacore and Salmon Catches

Surface Temperature	Salmon Gill Net	Albacore Gill Net	Albacore Troll
°F.	No.	No.	No.
54	1		
54.5			
55	3		
55.5		7	
56	2		1
56.5			
57			
57.5			
58	1	11	21
58.5			2
59		3	4
59.5			
60			1
60.5			5
61		1	5
61.5			
62			4
62.5			3
63		3	5
Total	7	25	1/51

1/ INCLUDES 13 TROLLING STRIKES WHERE THE ALBACORE WERE LOST BEFORE LANDING.

2.114

anyone against walking on that section when the deck is raised. Fourteen seconds are required to raise the false deck and open the side.

The surface of the deck is made of 3/8-inch steel with a top layer of $\frac{1}{4}$-inch boiler plate so that the working surface is rough. The boiler plate surface with the sand remaining on it is said to be better to work on than the usual sheathed deck.

The shaft from the hydraulic cylinder comes up through the deck and attaches with a pivot to the bottom of the false deck. An oval hole is cut through the main deck between two deck timbers to accommodate the movement of the hydraulic shaft. As the false deck lowers, the hydraulic shaft carries the boot back with it into the hold.

2.119

Controversy became apparent when consideration of maneuvering to avoid collision opened. The need for studying this subject arises from the agreed presumption that the present steering rules, that is, "giving way" ship and "standing on" ship, can only be applied between ships in sight of one another. In fog, therefore, there is a period, long or short, between radar contact and hearing or seeing the ship at close quarters, during which ships are under no obligation except to sound fog signals and go at a moderate speed.

On the subject of amending the collision regulations to take account of radar, diverse opinions were expressed and all suggestions for amendment were left for further study.

The subjects discussed under the heading of assistance from electronic or other equipment are best considered in two categories, depending upon the echo alone or on active cooperation from other ships; these categories also define opposing schools of thought. On the whole, the former school found more support than the latter.

The conclusions reached by the meeting showed that there was unanimity in assigning the blame for most of the collisions which have occurred to the human element, which often failed to appreciate the risks inherent in entering close-quarter situations at speed and to understand the limitations of and best ways of using radar equipment.

2.1471 SHRIMPS AND SHRIMP FISHING METHODS IN THE U. K.

Noel, H. S.
World Fishing 6, 51-55 (June 1957)

Two types of shrimp are fished in British coastal waters, the pink shrimp, or Aesops prawn (Pandalus montagui), and the brown shrimp (Crangon vulgaris).

Although the brown shrimp is occasionally found in quantity offshore on sandy ground, it largely inhabits the tide line, where it is taken by small shallow draught boats, or by "push-netters". The push-netter operates by wading with the tide at about low water pushing a wooden framed net of up to 6 feet width. This he lifts at intervals to remove crabs, weed, and other debris from the net, and to transfer his catch to a basket on his back. The ability of the brown shrimp to survive for some time out of water, makes it possible for cooking to take place ashore. About a bushel (8 gallons) per tide is considered a good catch.

The season for brown shrimp is practically continuous, reaching its peak in the autumn; the pink shrimp usually appear about April, and become in berry from October onwards, when fishing ceases.

The pink shrimp is found in depths from 1 fathom or more, being generally fished between 5 and 15 fathoms.

The shrimp trawl used is usually of the beam type, having two iron "heads" which, by their weight, keep the gear on the bottom, and by their height keep the net open vertically. The heads are fitted on either end of a wooden or metal beam, which spreads the net horizontally, and varies in length from 12 to 25 feet. From the "heel" of either head runs the ground rope, trailing in a half-circle bight. The beam is towed by a bridle attached to the heads.

Beam heads.--These vary in size and weight with the gear and depth of water. For a 25-foot beam fishing in 15 fathoms, each would be about 24 inches high and weigh about 100 pounds. The "shoe" at the base is usually detachable to facilitate renewal as it becomes worn. Attachment for bridle and ground rope are provided, as are sockets for the beam. One socket is often round, to

(over)

 ABSTRACTER: Kathryn L. Osterhaug

2.15 PRESERVATION OF FISH IN CHILLED BRINE TANKS DURING TRANSPORT--EXPLORATORY VESSELS

Lantz, A. W.
Ceylon Department of Fisheries, Progress Reports Biological and Technological No. 2, 38-43 (July 1956)

Introduction and purpose.--One of the most difficult problems that faces the fishing industry of Ceylon is distribution. Ice, which is relatively expensive, is difficult to transport in a satisfactory condition and subject to heavy weight losses in transit. Refrigerated sea water was found in a previous study to be an effective medium for transporting and holding fish in Ceylon. This study was made to try out chilled sea water holding aboard two fishing trawlers under actual fishing conditions.

Experimental.--Sea water holding tanks were designed and installed aboard the exploratory vessels, the Canadian and the North Star, by the Ceylonese crews of the vessels, under the direct supervision of their Canadian skippers. These vessels then put to sea in keeping with their work of fishery exploration in the littoral waters along the East coast of Ceylon.

Results.--After 3 days at sea from Colombo, Ceylon, the Canadian and North Star arrived in Trincomalee with 600 pounds of excellent quality fresh fish. No ice was used during the trip. Instead, the fish were stored for 3 days in refrigerated brine. When sold to the dealers, these fish brought 74 cents per pound. Formerly, iced fish from these vessels had brought a maximum of 50 cents per pound.

Other observations were as follows: (1) chilled brines or chilled sea water proved efficient for holding and preserving fresh fish quality for up to 23 days under local conditions; (2) prior to the installation of brine tanks, the weekly expenditure for ice averaged Rs. 250; whereas the cost of operation of the refrigeration equipment off of the main engine was negligible; (3) as soon as the fish have been dressed, they are placed in the chilled sea water or brine where they are held at 30° F.

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 ABSTRACTER: Martin Heerdt

2.1471 PAIR-TRAWLING ON THE GRAND BANKS

Rojo, Alfonso
Trade News 10, 3-4 (July 1957)

In 1949, a pair of Spanish trawlers proved that pair-trawling could be carried out on the Grand Banks with as much success as on their home grounds. By 1951, a total of 57 Spanish trawler teams were operating on the Grand Banks. The Grand Banks pair-trawling fleet now has leveled off at 27 pairs each season. The normal length of the fishing voyage--the catch is split and salted down in the holds--is 60 to 90 days. Each pair normally makes three trips to the Banks a year.

In pair-trawling, ships operating as a team are normally of the same tonnage and power. The sizes of the ships vary from 132 to 300 tons (gross) and carry crews of 17 to 24 men.

Pair-trawlers use no "doors". The towing of the net between the two ships, which operate about a half-mile apart, holds the mouth open. The mouth of the net is wider than that used by otter-trawlers, but it is not as deep. In order that the net be close to the bottom during the drag, the ground rope has a chain attached. The nets are usually made of hemp and are of single twine in the cod-end.

Shooting the net is much the same as in otter trawlers, but taking it back is a special operation. When the ships begin to take back the cable they move together until they are about 25 yards apart. Then, one of the ships transfers its part of the net to the one which is to take the fish onboard. When the net is close to the side of the ship, the side of the cod-end is opened and the fish are removed by a dipnet. When only a small quantity of fish remains, the whole net is taken aboard.

See illustration, over.

(over)

 ABSTRACTER: Kathryn L. Osterhaug

2.9 THE ETIOLOGY AND EPIDEMIOLOGY OF PARALYTIC SHELLFISH POISONING

Edwards, H. I.
J. Milk & Food Tech., 19, 331-335 (1956)
Food Science Abstracts 29, 216 (June 1957)

Poisoning of a paralytic type is sometimes caused by the consumption of shellfish. It has been found that the shellfish obtain the toxin preformed in the plankton that they eat. The organisms that contain the toxin (Gonyaulax catenella)in the Pacific plankton, and Gonyaulax tamarensis in the Atlantic plankton) are most plentiful in the summer. The amount of toxin in shellfish depends on the numbers of toxic organisms in the plankton, and on the location of growth, shellfish in sheltered waters containing much less toxin than shellfish from beds exposed to the open sea, or to active tidal currents, In some shellfish the poison is concentrated in the digestive glands or 'livers', in others, in the gills or in the siphon; the removal of these parts during commercial processing diminishes the risk of poisoning. On the Pacific coast of the United States, the sale of shellfish is forbidden in the summer when toxicity is liable to be high, and on the both coasts of Canada the collection of shellfish is prohibited as soon as sampling shows that toxicity is rising. The toxic material has been concentrated 200-fold by chromatography, and is considered to be an alkaloid; as little as 0.25 μg. kills a mouse. It is heat-stable in neutral and acid solution, but readily destroyed in alkaline solution; it is soluble in water, acids, and lower alcohols, but insoluble in ether and chloroform.

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SHRIMP FISHING METHODS

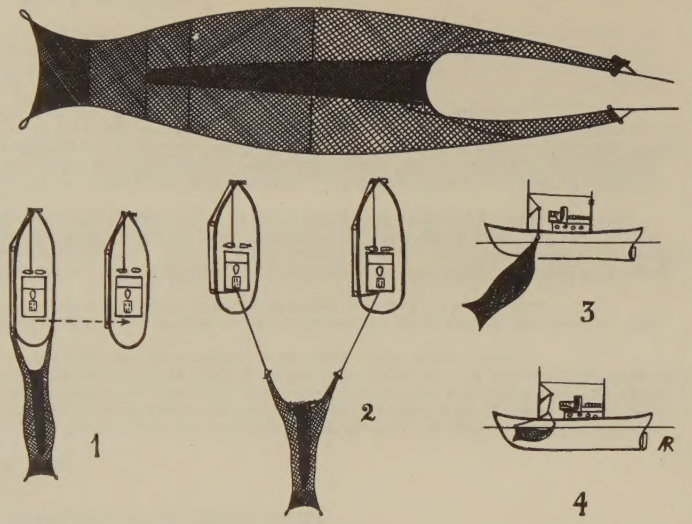
PAIR-TRAWLING

CHILLED SEA WATER HANDLING

SHELLFISH POISONING

2.1471

Top: The net used by pair-trawlers. The loops in the cod-end are used to hang the net while taking out the fish.
Bottom illustrations: These show the method of pair-trawler fishing. Figures 1 and 2: Shooting the net. Figures 3 and 4: Taking in the net. Figure 4 shows the method of holding the net while removing fish from the cod-end.



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2.1471

allow the beam to revolve in the head; this prevents strain on the beam during fishing and when stowing, as the after head is often allowed to hang over the stern when steaming.

The bridle. -- This is of 3 inch rope and 1½ times the length of the beam. A block, through which the towing warp passes, is shackled to a thimble seized in the center, to give a purchase when hauling.

Ground rope. -- This varies with the type of bottom; on rocky ground 7-inch or 8-inch wooden bobbins are used in the bosom, and 4-inch rubber discs at the wings. On smooth ground, 4-inch or 3-inch rubber discs are used, or a combination of both. Large diameter ground ropes help to diminish the quantity of "rubbish" picked up, and reduce the chance of a fast or snub. Under some conditions, a smaller ground rope will give better fishing, however.

The net. -- This is of cotton, of 3/4 inch or 7/8 inch mesh, the cod end of a 25-foot net being 2 or 3 score meshes across and of heavier twine. The headline of the net is usually partially or completely stopped on to the beam, as height is not important.

The cod end is roped well up the selvedge, as heavy catches are often experienced. A garter is tied round the base of the cod end as a precaution against a badly tied draw rope. A cod end buoy is used to determine the position of the gear and to afford a second means of getting the gear in the event of a fast.

Towing speed is slow--just faster than the tide--which is why otter gear is not used. In effect, this means that shrimp, startled by the ground rope, are gently swept into the net by the flow of the water through it.

Towing warp. --This can be of rope (3-inch manila) where a capstan or hand hauling is necessary, or, preferably, of wire (5/16-inch to 3/8-inch diameter). The practice of running the warp through the bridle block and back to a fixed point for'ard on the boat, has the advantages of extra purchase in hauling, and of giving a variety of warp positions for countering wind and tide set.

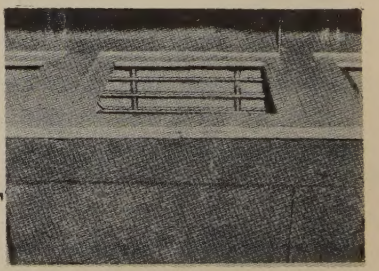
In deeper water where maximum warp is required to give the heads a correct fishing angle, single warp can be used where a trawl winch is fitted that has limited accommodation for wire on the drum. Wire warp does not tend to lift the gear as much as rope, allowing less warp and lighter gear to be used.

2.15

until the vessel reaches port and the fish are sold; (4) fish stored in chilled seawater or chilled brine required a minimum of handling; (5) ice and the icing of fish was eliminiated; and (6) the fish, upon removal from the tanks, have the appearance and characteristics of freshly caught fish.

Maintenance. --Brine tanks aboard ship must be thoroughly cleaned after the fish have been unloaded at quayside. Fresh brine then is placed in the tanks before the ship leaves port. Shore based brine tanks require regular cleaning and recharging with fresh brine at weekly intervals.

Conclusions. --The critical period in fish preservation is the interval between catch and rapid chilling. In Ceylon, where temperatures are uniformly high, any method which permits rapid transfer to chilled storage is highly desirable. Highly efficient chilling devices for use in transit, for holding fish at landing centers, and for holding fish at wholesale and retail markets are essential if the consumer is to receive a satisfactory product and the producer is to receive a fair return for his labor. Chilled brine tanks appear well suited to the needs of Ceylon's fishing industry. For handling surplus catches that cannot be sold within a short time, freezing and storage at subzero temperatures are necessary.



Refrigeration tank installed in the hold of the "Canadian".

3.12 THE PROBLEM OF PROVING FOOD ADDITIVES ARE SAFE

Oser, Bernard L. (Food Research Laboratories, Inc., Long Island City, New York)
Food Processing 18, 28-30, 41 (July 1957)

The Food Protection Committee of the National Research Council lists about 500 food additives. Some 150 of these substances--almost exclusively of flavor chemicals--have not been studied sufficiently with regard to their safety for use as food additives. Although no tolerance limits have been established for flavoring agents, the Food, Drug and Cosmetic Act provides for the establishment of tolerance for poisonous or deleterious substances added to food if they are required in production or their use is unavoidable in good manufacturing practice. Under present law, the use of poisonous or deleterious substances is not exempt, however harmless the substance may be in the amounts used.

Legislation introduced in recent years provide for amendment of the law to require prior testing of food additives for safety, to shift the burden to industry rather than requiring the government to prove toxicity. A common provision is that they must be safe for use under the conditions of intended use. Some proposed legislation covers only new additives and excepts by definition those in use prior to a given date. One such bill, HR 6747 of the 85th Congress, would exempt any additive that is "generally recognized, among experts qualified by scientific training and experience to evaluate its toxicity or other potentiality for harm, as having been adequately shown through scientific procedures or through prolonged use in food to be safe under the conditions of its intended use." Factors of importance for exempting flavor chemicals under such provision would be criteria for establishing prolonged use, proof of identity of each chemical, and origin whether natural or synthetic. It is reasonable to assume that prolonged use can more readily be established for essential oils as a class than for synthetic organic chemicals.

It appears, therefore, that synthetic flavor chemicals will be the major problem with respect to proving their safety as food additives. The proper form of organic chemicals found in flavoring agents from natural and synthetic sources and their class is shown in the following summary table (see over).

(over)

ABSTRACTER: John A. Dassow

3.231 PROTECTING COLD STORES

Anonymous
Food Manufacture 32, 321 (July 1957)

A rise in temperature usually occurs in a cold storage room when the insulated doors are kept open to allow goods to be moved in or out of storage. One means of eliminating the entry of warm air into cold rooms is through the use of an air curtain. This air curtain can be obtained with an aerofoil fan that directs a high velocity air stream across the open doorway.

The function of an air curtain is to entrain air in the immediate vicinity of the entry door. Warm air carried by convection toward the open entry is collected by the descending air stream of the air curtain before it can enter the door. With the protection afforded by an air curtain, the cold storage operator is able to move goods in and out of storage rapidly and with a minimum of effort. Mechanized handling with lift trucks also is greatly simplified as the need for opening and closing entry doors is eliminated.

Ordinarily, the air curtain unit is mounted directly above the outside door. If head room is a problem the mounting location can be varied. Operation of the aerofoil fan that produces the curtain can be made automatic by mounting an electrical contact directly on the door frame. With this type of installation the fan will operate whenever the door is left open.

ABSTRACTER: Martin Heerdt

3.19 THE RED PIGMENT OF PRECOOKED IRRADIATED MEATS

Tappel, A. L. (University of California, Davis)
Food Research 22, 408-411 (July-August 1957)

Irradiation of precooked meats converts the normal brown or gray hematin pigments to uncharacteristic red pigments. This color change is undesirable because the degree of doneness of cooked meat is judged by its color.

Purpose. -- This study characterizes and identifies the red pigments of precooked irradiated meats by the use of reflectance spectra.

Experimental. -- Samples of beef, pork, chicken, and tuna were pressure cooked for 10 to 15 minutes at 10 pounds per square inch to develop a characteristic brown or gray color in the cooked meat. The cooked meats then were nitrogen packed into No. 2 cans, and the canned meats were irradiated with a dose of 2×10^6 rep. The complete visible reflectance spectra of each of the irradiated samples was recorded with the aid of a Beckman DR recording spectrophotometer with reflectance attachment. Unirradiated controls were reduced by painting them with a solution of sodium hydrosulfite.

Results. --Typical reflectance spectra for tuna are shown in figure 4 (see over). All of the plots of reflectance spectra data for the cooked meats are typical of denatured globin hemichrome. Upon being reduced with sodium hydrosulfite each of these meats developed a double-banded spectra characteristic of denatured globin hemochrome. The spectra of denatured globin hemochrome and the reduced pigments of cooked meats in general, show a strong α-peak at about 560 mμ and a secondary β-peak at 530 to 535 mμ that is less pronounced in beef than in pork, chicken, and tuna. All of the precooked irradiated meats have a double-banded spectra with α- and β-peaks at approximately the same wave length as denatured globin hemochrome.

Actually, the reflectance spectra of the precooked irradiated meats show greater correspondence with the reflectance spectra of derivatives of denatured globin hemochrome, such as denatured

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ABSTRACTER: Martin Heerdt

3.2380 FROZEN SHRIMP

Anonymous
Arsberetning fra Fiskeriministeriets Forsogslaboratorium for 1956 (Annual Report to the Danish Fishing Industry with English translation of the main experimental results) pp. 33-34 (1957) (Copenhagen, Denmark)

The Laboratory has now completed another experiment in a series which was commenced several years ago in order to estimate the effect of freezing and packing methods on the preservation of the quality of frozen shrimp during cold storage. Deep-water shrimp from the Skagerrak were used. They were boiled for 5 minutes in fresh water without salt or other additives and afterwards cooled, also in fresh water without additives. The peeled shrimp were frozen in lots of 175 g. at -30° C. and afterwards stored at -20° C. for periods up to a year.

The methods of packing used fall into two groups, namely.

1. Shrimp packed in retail packing, and then afterwards frozen.

2. Shrimp packed in freezing containers, frozen, and afterwards packed in retail packing.

In the first method, peeled shrimp packed loose in bags made of cellophane MSAT, polythene, pliofilm, or Cry-O-Vac and afterwards heat-sealed, showed after a few months' cold storage a great deal of loose crystals of ice, resulting from the drying-up of the shrimp flesh, while the appearance of the flesh, the flavor and consistency showed clear indications of this drying. On the other hand, packing in Cry-O-Vac bags, evacuated before freezing, shrunk in warm water, and made air-tight, gave a highly consistent frozen product, but of irregular shape.

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FOOD ADDITIVES

PIGMENT OF IRRADIATED MEATS

AIR CURTAIN FOR COLD ROOMS

PACKAGING FROZEN SHRIMP

3.19

globin carbon monoxide hemochrome, than with the reflectance spectra of denatured globin hemochrome itself. To postulate that the irradiation of precooked meats forms a mixed hemochrome more complicated than that of reduced cooked meats is unwarranted. None of the compounds that characteristically form mixed hemochromes with these spectral characteristics have been found in irradiated meats. The red pigments of irradiated precooked beef, pork, chicken, and tuna showed typical hemochrome oxygen lability and were readily oxidized to brown hemichromes. The red pigments of precooked irradiated meats can be characterized best by describing them as denatured globin hemochromes slightly modified by irradiation to give a reduction of the α-peak.

Reduction is one of the main reactions that occurs during the irradiation of hematin compounds in oxygen-free solution. In the absence of oxygen, ferricytochrome c in aqueous solution is efficiently reduced by ultraviolet and x-irradiation both in pure solution and in the presence of organic molecules such as benzoate and succinate. Cyanide hemichrome also may be reduced to a hemochrome be x-irradiation. The reduction of the denatured globin hemichromes of cooked meats to their corresponding hemochromes by gamma irradiation is a further extension of the generality.

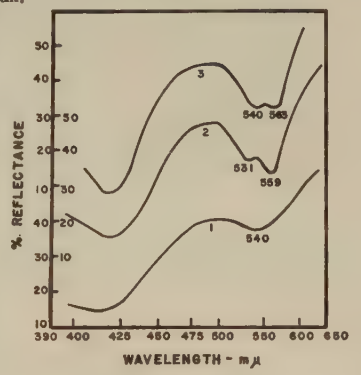

Figure 4. Reflectance spectra of cooked tuna:
1. Untreated
2. Reduced with sodium hydrosulfite
3. Irradiated at 2×10^6 rep

3.2380

In the second method, the peeled shrimp were frozen in freezing containers before packing (see the Annual Report for 1954, page 9). This packing is not quite so compact as the Cry-O-Vac packing just discussed. On the other hand, a more appealing shape is obtained and the block of shrimp after being taken out of the freezing container can be glazed. The glazing process has proved to be essential in maintaining the quality. Glazing was done by dipping the frozen block in clean icy water at $\frac{1}{2}$ minute's interval.

Glazed blocks packed in cellophane and carton with cellophane cover or by the Cry-O-Vac bag process retained their eating quality very well during cold storage, while the corresponding packings of unglazed blocks were of a poorer standard. The difference between glazed and unglazed blocks in the case of those packed in Cry-O-Vac was, on the whole, not very big. It must be assumed, however, that an unglazed block in Cry-O-Vac will quickly spoil during cold storage, if the evacuating and shrinking of the bag has not been very effective, or if the bag is injured. The Laboratory must therefore emphasize the influence of glazing on the maintenance of quality of the frozen blocks.

Storage temperature in these experiments was in each case -20° C. The period of keeping quality would presumably be twice as long if the temperature was lowered to -30° C.

3.12

Newer methods of analysis have provided more reliable information about the composition of natural flavors. Studies of coffee, tea, and fruits have shown that at least 145 different organic compounds contribute to the flavor of the natural products, many of which are employed in artificial flavors. Problems in proving the safety of these organic chemicals for food use include: (1) identity of the chemicals and the exact composition of end products when mixtures are used, (2) the effect of changes undergone by the additives after addition to foods or during processing and subsequent aging, and (3) the expense of long term chronic toxicity studies with two species of animals as usually required.

Organic Chemicals Used or Found in Flavoring Agents

Class	Total[1]	FPC List[2]	In Natural Products[3]
Alcohols	39	23	35
Aldehydes	36	23	13
Ketones and Lactones	38	22	10
Acids	34	7	28
Ethers	13	3	—
Esters	222	127	27
Other	49	15	33
TOTALS	431	220	146

Among the suggested solutions to these problems are: (1) cooperative tests undertaken by all companies interested in a single compound; (2) the possibility of allowing short-term (90-day) feeding tests for evaluation when the intended uses are sporadic or infrequent; (3) the use of short-cut metabolic determination to show the relation to normal metabolites, the conversion to recognized nontoxic compounds, or the degree of absorption or retention of suspected toxicants; and (4) the testing of composite samples where advantage may be taken of the chemical and pharmacological similarity of compounds within a given organic class.

Every chemical component probably will not require a two-year toxicity study. Long range toxicological studies would be required probably for flavor chemicals or mixtures of unknown (but reproducible) composition for which metabolic studies are not applicable. The imposition of maximum food tolerances is important because it provides protection not only for the consumer but for food manufacturers who use additives properly and safely.

3.231

3.2344 RADIAL-PLATE FREEZER ACHIEVES LOW-COST OPERATION

Havighorst, C. R.
Food Engineering 29, 70, 73 (July 1957)

A new food freezer that uses the principal of intermittent rotation of refrigerated plates around a center axle has been installed in a Seattle ice cream plant. The new food freezer is used for quick freezing rectangular packages of ice cream at the rate of 550 to 600 gallons per hour (g. p. h.) of pints or quarts, or 500 g. p. h. of half-gallons.

Freezer operation is semi-automatic in that an employee is required to press a button when the proper number of cartons have been assembled on the feed conveyor. All other operations are controlled by an electrical relay system.

Design. --The radial-plate freezer has 30 pairs of 21 x 120-inch freezer plates radiating about a central, hollow, driven axle. The lower plate of each pair of plates is fixed to the axle, whereas the upper or floating plate is supported by pivot connections to four arms that are also fixed to the axle. A series of 11 coil springs are attached between each pair of plates. The spring tension of these springs provides a constant uniform pressure of about 500 pounds on the filled cartons between each plate. The distance between pairs of plates is self-adjusting to accept packages that vary in thickness from 2 to 3½ inches. The freezer accommodates 5,046 pints, 2,346 quarts, or 1,700 half-gallon packages. A two-stage hydraulic pressure system intermittently rotates the freezer plates, actuates feed and discharge plunger bars, and actuates the carton lowering device. Pressure is maintained in this system with a 1½-horsepower pump.

Button operation. --By pushing a button, the operator actuates a series of steps that are controlled

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 ABSTRACTER: Martin Heerdt

3.2493 COLD STORAGE OF FROZEN PACIFIC OYSTERS (CRASSOSTREA GIGAS)

Osterhaug, Kathryn L. and Nelson, Richard W. (U. S. Fish and Wildlife Service, Seattle, Washington)
Commercial Fisheries Review 19, 10-14 (June 1957)

Packers of Pacific oysters are troubled by an occasional lack of uniformity and good quality in their product after frozen storage. Through the Pacific Coast Oyster Growers Association, they requested that experimental work be carried out to help improve the quality of frozen Pacific oysters.

Certain physical and chemical changes take place in oysters during frozen storage. The body of the oyster darkens gradually and the oysters exposed to the headspace of the can become yellow. The oyster loses some of its firmness and becomes flaccid. The dark pigment from the mantle sloughs off and causes the drip to have a slightly sooty appearance.

While these changes are taking place, a change in flavor also develops. The normal fresh oyster flavor disappears and strong bitter off-flavors develop after extended storage.

The continuing aim of the present experimental work on frozen Pacific oysters is to slow down or prevent these changes so that (1) the quality of the frozen oysters is improved and (2) the marketing period is extended to a period of a year or longer.

Experimental. --The oysters used in these investigations were obtained from beds in the Willapa Bay area of Washington. They were obtained, freshly shucked and blown, from a commercial plant in South Bend, Washington; placed in 5-gallon milk containers, packed in ice, and transported by truck to the Service's Seattle Fishery Technological Laboratory. The containers were held overnight in crushed ice, treated, and packed in 10-ounce oyster cans, sealed, and frozen the following day.

Approximately one-half of the oysters were blanched for one minute in boiling water and then drained before being treated and packed. The remaining oysters were treated and packed raw. Treatments consisted of dipping the oysters in solutions of the following antioxidants: (1) antioxidant mixture[3] dissolved in U. S. P. propylene glycol[4]; (a) nordihydroguaiaretic acid (NDGA) 0.10 percent by weight of oyster, (b) beta hydroxyanisole (BHA) 0.02 percent by weight of oyster, (c) ascorbic acid

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 ABSTRACTER: Kathryn L. Osterhaug

3.2380 BETTER MEAT PACKAGING

Anonymous
The National Provisioner 136, 31-32, 47 (June 22, 1957)

Present day meat packaging is in a constant state of change. The machines, labor, and materials used in packaging are expensive. The cost of supplies alone cost the meat industry in excess of $250 million last year.

The constantly changing picture means that packers must be careful not to make poor decisions in buying machinery and choosing packages.

Packaging cannot be separated from manufacturing and shipping processes. A slip anywhere in the plant can cause consumer rejection.

Selection of package. -- Here are some of the more important questions to consider in selecting the type and size of package for a particular product:

1. What sizes are being successfully sold in the trade area? If two sizes are being sold, what are the possibilities for selling the larger unit?
2. What size and shape seems to fit the limits of household storage best?
3. If there is a need to use the package for storage of the product in the household refrigerator, can this be done easily?
4. Does the package meet the government labelling requirements?
5. Does it give the maximum necessary protection of the product in view of the individual firm's own distribution pattern?

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 ABSTRACTER: Kathryn L. Osterhaug

3.2497 TIME-TEMPERATURE STUDIES REAFFIRM 0° STORAGE LEVEL

Anonymous
Food Packer 38, 25, 45, 46 (June 1957)

Work carried on in the Western Research Laboratory of the U. S. Department of Agriculture has confirmed the value of 0° F. for frozen food storage. Surveys in the frozen food industry, however, show that this theoretical standard is far from actual industry practice. A survey of retail cabinets showed that a considerable portion of the frozen food was at 10° F. and above. Another survey revealed that the temperatures of 50 percent of the warehouses were at 5° F. or above. Some warehouses had no thermometers.

Effects of time, temperature. -- In general, fluctuations in temperature of frozen foods were found to have an effect similar to the average temperature over the same period of time. The speed of deterioration increased with increasing temperatures. Equal deterioration was found in peaches held at: 0° F. for 1 year, 10° F. for 1½ months, or at 28° F. for 1 day. The rate of deterioration varies for different products.

Improved production methods. -- Surveys of frozen food warehouses and retail display cases indicated a need for better equipment to maintain low temperatures along the complete distribution chain. A strong program is needed to educate everyone from processor to consumer to maintain proper frozen storage temperatures at all times.

Devices for checking quality. -- Flavor testing by a trained panel of quality control technologists using the triangle method was used to correlate objective tests with subjective qualities. Color changes were noted by the use of instruments as well as by observation. It was determined that a 7 percent loss of chlorophyll in snap beans could be detected visually. After conferring with members of industry it was determined that the point where complaints can be expected from consumers is after a 50 percent loss of chlorophyll.

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 ABSTRACTER: Kathryn L. Osterhaug

RADIAL-PLATE FREEZER

PREPACKAGED MEATS

FROZEN PACIFIC OYSTERS

FROZEN FOOD STORAGE

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6. Can it be applied to the product economically?
7. Is the design distinctive?

Vacuum packaging.--Investigations have shown that when a vacuum of from 27 to 28 inches is maintained in a package, product color is maintained longer than in a package without a vacuum. To get maximum color retention in a vacuum package, it is advisable to avoid entrained air in the product.

Although vacuum packaging is effective in reducing the type of bacteria that cause discoloration, it does not inhibit those that cause souring and other spoilage. Bacteria that cause greening continue to grow under vacuum, but they do not blossom forth until the package is opened. A vacuum package can give a careless operator a false sense of security.

Packaging machinery.--The trend in prepackaging is toward the use of more high-speed automatic machinery. Unfortunately, most of the automatic wrapping machines available for meat are modified units originally designed for handling other products. They lack the ability to handle the slight irregularities that are characteristic of some meat products.

Production methods.--Man-hour production rates vary greatly. The arrangement of hand labor ahead of a wrapping machine is what determines the man-hour production of the department. Spacing of work stations and reaching distances have much to do with work speed. Minor changes in these conditions may increase output substantially.

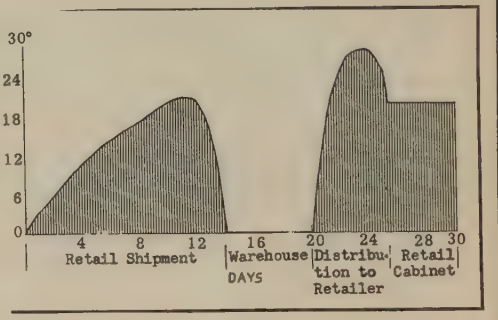
Experience has shown that the processor must be wary of so-called "machines" that rely on too many or on slow hand operations to prepare the package for sealing.

Frozen meat.--The big problems here seem to be the development of less expensive packaging methods and the reduction of handling necessary in present freezing methods. One successful, though relatively expensive, technique for packaging frozen meats is the use of a gas impermeable film bag with good low-temperature resistance to brittleness. The bag is filled, air is evacuated, and the bag is sealed and placed in a wax carton with a window to show the product. A variation is the use of a waxed box overwrapped with waxed paper.

3.2497

The temperature graph reproduced on this card represents experience of a typical package of frozen food as it goes through the chain of distribution.

The history of a package of frozen food during the 30 days after it leaves the processor is shown by this temperature graph. The trouble spots in transportation and retail display cases were emphasized during the recent annual meeting of the Institute of Food Technologists.



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by an electrical relay system. A row of cartons is fed into the freezer and, simultaneously, a row of cartons is discharged onto the hydraulic elevator. The elevator unit then gently lowers the cartons onto a take-away conveyor. This cycle is repeated each time the button is pressed.

Installation.--The radial-plate freezer is installed in a room insulated with 6 inches of cork board. This room is 11 feet high, 16½ feet wide, and 22 feet long. Freezer plates are maintained at -30° to -35° F. with liquid ammonia. To reach the plates the ammonia is pumped through the rotary joint of the hollow axle by a 3-horsepower ammonia pump and then through 4 pipes into the circular manifold. Each of the 30 pairs of plates is served from the manifold by ½-inch inside diameter hoses. Freon may be used as a refrigerant in place of ammonia. The refrigerant requirement is estimated at 20 tons to maintain a plate temperature of -35° F.

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0.02 percent by weight of oyster; and (2) ascorbic-citric acid mixture in water (0.5 percent ascorbic acid, 0.5 percent citric acid).

In addition to the antioxidants, the following treatments were included for control and comparison: (1) control--no treatment, (2) oxygen--air in headspace of can replaced by oxygen, (3) nitrogen --air in headspace of can replaced by nitrogen, and (4) propylene glycol--for comparison with oysters treated with Tappel's mixture.

Examination of samples.--At two-month intervals over a period of 13 months, samples of the frozen oysters were removed from storage and examined. A variety of tests were performed in order to follow any changes that might be taking place. The following determinations were made on the thawed oysters: (1) pH, (2) free drip, (3) expressible drip, and (4) organoleptic evaluation (odor, appearance, and flavor).

Conclusions.--The storage life of freshly shucked Pacific oysters, frozen in hermetically sealed containers and stored at 0° F., appears to be approximately 8 months. The antioxidants tested appear to have at least a limited effect in retarding oxidative changes in Pacific oysters frozen in sealed cans. Replacing the air in the headspace of the can with nitrogen or with oxygen had very little effect on the rate at which the samples deteriorated. Nitrogen slowed the rate slightly, whereas oxygen increased it slightly.

There are several important factors which should be considered before antioxidants are used. First, antioxidants are of little or no value if the quality of the oyster is poor at the time of freezing. Second, proper care and handling are more important in obtaining a good frozen oyster than antioxidant treatment. Third, the carrier used in applying the antioxidant must be carefully chosen. It must not have a flavor which would be detectable in the oyster product and it must be acceptable to the Food and Drug Administration.

3/ Recommended by A. L. Tappel, University of California, Food Technology Department, Davis, Calif.

4/ Antioxidant pick-up was assumed to be proportional to the pick-up of the solvent. This was measured prior to dissolution of the antioxidants.

$$\text{wt. \% antioxidant dissolved in solvent} = \frac{(\text{concentration of antioxidant})(\text{wt. oysters})}{(\text{wt. solvent absorbed per wt. oysters})}$$

3.2497 GAGING FROZEN FOOD TEMPERATURE

Guadagni, D. G. and Jansen, Eugene F. (Western Utilization Research and Development Division, USDA, Albany, California)
Food Engineering 29, 74-75, 77 (July 1957)

Several methods were developed that would permit frequent checks of product temperatures in the case without puncturing individual packages.

Method A. -- The most satisfactory method, is as follows: (1) open top of case, (2) remove corner package, (3) punch a hole through the case wall from the inside of the case at the desired position, (4) replace the packages, (5) close the top, (6) insert the thermometer into the punctured hole to a distance of 3 inches and (7) wait 5 minutes before reading the thermometer. This method, which was based on the results of repeated tests, showed that the temperature at the center of the corner package in a case remains constant for at least 10 minutes after the case has been opened. This rule applies to cases that are removed from 10°, 20°, and 30° F. storage into a 70° F. room for the measurement of package temperature.

Method B. -- An alternate method, is as follows: (1) cut out a small section of the case wall near the top corner package with a sharp blade, (2) place the thermometer exactly where the first and second packages come together, (3) force the cut end of the cardboard against the package and thermometer stem, and (4) wait about 5 minutes before making the reading.

Method C. -- Another alternate method, is as follows: (1) mark the outside of the case where the top corner package should lie (similar types of cases and packages do not always have exact dimensions, consequently a marker will result in the puncture of an occasional package), (2) punch a hole through the case wall only, and (3) with extra precaution probe for the space between packages.

Temperature checks. -- The temperature of 16 different commercial frozen foods was measured under various temperature conditions and at various positions in the case with a simple metal dial-type thermometer that is unbreakable, rapid and easy to read. A minimum of 3 inches of the

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 ABSTRACTER: Martin Heerdt

3.63 NEW DEVELOPMENTS IN THE FREEZE-DRYING OF MEAT

Smithies, W. R. (Defense Research Medical Laboratories, Toronto, Canada)
Chemistry and Industry No. 29, 1008 (July 20, 1957)

The armed services of the United States, the United Kingdom, and Canada are planning for substantially increased use of dehydrated foods. Even at present, a wide range of dehydrated foods are already available or in the final stages of development. These dehydrated foods rehydrate rapidly; and after they have been cooked by conventional methods, they closely resemble cooked fresh foods. In many instances, they are superior to canned foods.

Method. --Vacuum freeze-drying is the only satisfactory method of preparing dehydrated meats and meat items. When raw meat is dried it is frozen before being loaded into the drier, whereas when cooked meat is dried it may be frozen by evaporative freezing in the vacuum chamber of the freeze-drier. Meats to be prepared for vacuum freeze-drying are sliced, laid on drying shelves, and subjected to drying in a vacuum chamber in which the air pressure does not exceed 1 millimeter of mercury. During freeze-drying, the meat remains frozen; and the ice is slowly sublimed away until the meat becomes dry. Shrinking does not occur, and the meat fibers remain in their original position. The dehydrated product is very porous and rehydrates rapidly.

Processing. --Dehydration by freeze-drying is a relatively high cost method of processing owing to the 10 to 15 hours of drying time that is required. The long drying time results from an inefficient transfer of heat. Improved and more uniform heat transfer can be obtained by placing the slices of meat between spiked plates. Spikes that improved the rate of heat transfer were made of aluminum and spaced ½-inch apart on the drying plates. Spikes from the top and bottom plates were alternated at uniform intervals. They not only increase the amount of drying surface but also increase the

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 ABSTRACTER: Martin Heerdt

3.30 BACTERIOLOGY OF CANNED FISH--2.

Riemann, Hans
Food Manufacture 32, 333-335 (July 1957)

Examination. -- Microscopic examination of the contents of the can yields information about preprocess spoilage and autosterilization. A wet mount slide examined by phase contrast microscopy is usually adequate for this purpose. If the bacteria fill more than one field and growth is not obtained by subculturing, it is desirable to apply the Breed microscopic count method that is used for milk. The smell, appearance, and pH of the can contents also must be recorded. Chemical tests and analysis of the headspace gas may sometimes be of value.

Interpretation of results with examined cans. -- Obviously, the contents of a can of spoiled food are unfit for human consumption even if bacteria are not detectable. Conversely, organoleptically good canned food may not be regarded as edible if it contains large numbers of dead or living bacteria. Usually, it is not difficult to distinguish between leaky cans, underprocessed cans, or cans swelled by chemical action.

Commercial sterility. --Organoleptically good canned food may contain living bacteria. This fact has led to the formulation of the term "commercial sterility." In oil packed products, bacteria trapped in the oil-phase are prevented from multiplication. The literature contains many papers that report the presence of bacteria in good canned fish. Cheyney (1919) reported that 8 percent of the canned fish examined was unsterile owing to the presence of spore formers. Savage (1923) reported that 100 percent of the canned crab examined was unsterile. Fellers (1926) found that 3.4 percent of the canned salmon examined contained a few bacteria. These references appear to have over-estimated the occurrence of bacteria in good canned fish, which may on rare occasions contain living bacteria.

Summary of bacteriological examination. -- Bacteriological examinations of preincubated canned fish may be summarized as follows: If many bacteria are present: (1) spore formers indicate underprocessed cans, (2) other bacteria indicate leaky cans, and (3) bacteria that are microscopically

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 ABSTRACTER: Martin Heerdt

3.7 STUDIES ON PROCESSING SQUID MEAT

Takahashi, T. and Takei, M.
Bull. Tokai reg. Fish. Res. Lab., Tokyo No. 14, pp. 31-90 (1956)
Food Science Abstracts 29, 124 (April 1957)

The effects of heating raw squid meat in water, on its length, strength, weight, toughness, etc., were investigated, also the effects of various treatments for reducing the toughness of boiled squid meat. Squid meat which was dried slowly absorbed less water on rehydration than that dried faster, and that dried below 15° C. absorbed more water than that dried at 22° to 29° C. Storage at temperatures above 3° C. diminished the amount of water absorbed on rehydration, but storage at -15° C. did not affect water absorption. Treatment with 0.3% of sodium lauryl sulphonate (or sulphate), 0.4% of sodium citrate, or 1% of disodium hydrogen phosphate, for 6 to 24 hours before drying, increased the water absorption of dried meat, but dissolved some of the protein; treatment with 2 to 10% of disodium hydrogen phosphate, or 2 to 5% of sodium carbonate, for 5 minutes, increased water absorption without dissolving protein. Dried squid meat immersed in solutions of different pH values showed minimum swellings at pH 5 and pH below 1, and maximum swelling at pH 9.3 and 2. Immersion in alkaline solutions removed color from the meat, but immersion in acid solutions usually did not.

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FOOD TEMPERATURE MEASUREMENT

CANNED FISH SPOILAGE

FREEZE-DRYING DEVELOPMENTS

DRIED SQUID PREPARATION

3.30 (Cross Reference: 0.5)

present only, indicate preprocess spoilage and autosterilization in the cans. If few bacteria are present: (4) spore formers indicate commercial sterility, (5) other bacteria indicate commercial sterility, and (6) bacteria that are microscopically present only, indicate commercial sterility and autosterilization. If bacteria are not detectable, the cans are commercially sterile.

Items (1) and (2) are unfit for human consumption, whereas (3) and (6) may be difficult to interpret if spoilage is not detectable. Some types of canned fish, particularly those that contain tomato puree, normally harbor many dead bacteria. A tentative standard, therefore, would be the presence of not more than 10^5 to 10^6 bacterial cells microscopically present per milliliter of content. Autosterilization obviously cannot destroy botulinum toxin, therefore the use of canned fish that has not been subjected to adequate heat processing may be disastrous. Staphylococcus entero-toxin found in canned wet pack shrimp confirms the theory that toxins are not always destroyed during commercial processing. Items (4) and (5) indicate under-processing or leakage if, on prolonged incubation of the canned product, the bacteria should multiply. These findings are dependent on the type of bacteria present and on the results of seam examination. Item (6) indicates commercial sterility. Incubation of the cans is the best bacteriological sterility test that can be used with canned fish.

Adequate sampling. -- If a lot of 300 cans is incubated and examined, 1 percent of the now stable cans in the lot will be missed. Such procedures are impractical because of the quantity of samples required, and they do not lead to clear-cut conclusions. Incubation tests, however will show pronounced cases of bad keeping quality.

Control of processing. -- Bacteriological control of the raw materials, the maintenance of proper seaming-roll tolerances, and the use of a calculated heat process for each canned fish product will prevent loss through spoilage.

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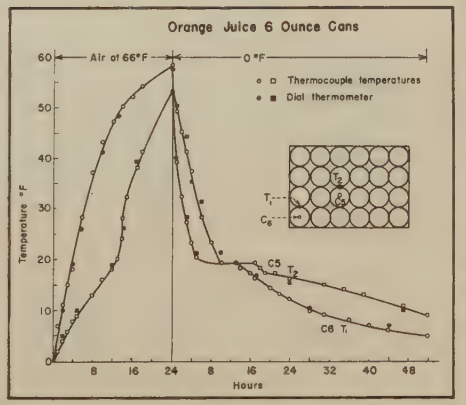
thermometer stem was inserted between the package whose temperature was desired and the adjacent package. Control temperatures were obtained with a recording potentiometer equipped with copper-constantan thermocouples that were inserted into the package centers. Full cases of frozen foods were warmed in air at 66° F. for 24 hours and then cooled in air at 0° F. Good agreement was obtained between potentiometer and thermometer readings. The chart below shows typical examples of temperatures in frozen concentrated orange juice during warming and cooling.

Air vs. product temperature. -- Product temperatures above 32° F. permitted major differences between the temperature of the air and the product, whereas product temperatures below the freezing point permitted only minor differences. Inside or outside measurements along the wall of the case did not accurately reflect the product temperature. Vegetables and fish sticks gave more accurate results when the thermometer was placed between the package edges. Pies, shrimp, and potato products give better results when the thermometer was placed between the top and bottom of adjacent packages.



Temperature curves show effect of package location in case. During warming (left), highest temperature is reached in topmost corner, lowest occurs in center. During cooling (right), corner package drops rapidly, while center one descends gradually.

3.63

rate of heat transfer. With spiked plates the drying time was reduced by from 3 to 5 hours. Freeze-drying requires an effective means of water-vapor removal; either steam ejector pumps or condenser plates were required to obtain the advantages of rapid freeze-drying. The application of heat must be decreased at the end of the drying cycle, otherwise the heater plates rise in temperature and scorch the surface of the dried meat. For this reason a significant reduction in the drying time is not possible because the drying temperature cannot exceed 55° or 60° C.

The author has proposed the use of radiation as a means of heat transfer in place of conduction. Specifically his idea is to provide layers of hollow shelves heated by steam or hot water within the drying chamber and to insert spiked plate units in between the shelves.

This is a report of a paper presented by the author at a meeting of the Society of Chemical Industry in London, England on June 26, 1957.

4.11 THE ESTIMATION OF SATURATED ACIDS IN MIXED FATTY ACIDS OF NATURAL FATS

Spickett, R. G. W.; Thorpe, E. F. J.; and Ward, J. B. (Colonial Products Laboratory, Imperial Institute Building, South Kensington, London, S. W. 7)
Chemistry and Industry No. 23, 734 (June 8, 1957)

Several methods have been used for determining the proportion of saturated acids in the mixed fatty acids of naturally occurring fats and oils. The procedure described below overcomes some of the difficulties inherent in the Bertram method and provides a simplified chemical method for the estimation of saturated fatty acids.

The methyl esters of the mixed fatty acids (5 g.) prepared by standard methods, are oxidized by potassium permanganate in acetone solution following the directions of Kartha. The oxidation products are recovered in the usual manner and dissolved in a minimum amount of light petroleum (b.p. 40 to 60° C.). This solution is percolated through a column (30 cm. long x 2 cm. diam.) of alumina (Brockmann activity 3), the percolate collected, solvent removed, and the resultant saturated methyl esters weighed. Generally 500 to 600 ml. of light petroleum are sufficient to elute the saturated methyl esters when the above quantity of mixed fatty acid esters is used.

When methyl myristate, palmitate and stearate, previously freed from unsaturated compounds, were subjected to this procedure, 99.3 to 99.6 percent of the starting materials was recovered from the column. With methyl laurate, the recovery was 97.1 percent. This procedure may also be of value in estimating the proportion of saturated glycerides in natural fats and oils (Kartha).

ABSTRACTER: Edward H. Gruger, Jr.

4.11 LIQUID-SOLID COUNTERCURRENT DISTRIBUTION OF FATTY ACIDS WITH UREA

Sumerwell, W. N. (U. S. Fish and Wildlife Service, Seattle 2, Washington)
Journal of the American Chemical Society 79, 3411-3415 (July 5, 1957)

The reaction of fatty acids with urea to form inclusion adducts has been used as the basis of a liquid-solid countercurrent distribution method for separating mixtures of fatty acids. The fatty acids and urea dissolved in an appropriate solvent served as the moving liquid phase, whereas the precipitated reaction products served as the stationary solid phase. The character of the distribution curve obtained for a given mixture of fatty acids depends on the difference in the distribution coefficients for the individual fatty acids when they are distributed between solid inclusion adducts and organic solvent. The method was found to be effective in the separation of a mixture of the cis-trans isomers, oleic and elaidic acids. The method also was applied to a mixture of highly unsaturated salmon-egg oil fatty acids (iodine value 350). The results indicate that liquid-solid (solvent-urea) countercurrent distribution may be a valuable tool in the separation of such unstable compounds as marine oil fatty acids.

A mixture of 5 grams each of technical-grade stearic, palmitic, and oleic acid was distributed over 24 stages at 20° C. in a urea-saturated solvent made up of 70 percent methanol and 30 percent ethyl acetate. The distribution of this mixture is shown in figure 2.

A mixture of 5 grams each of oleic and elaidic acid was distributed over 12 stages at 20° C. in urea-saturated methanol. Fractions 0 through 5 were solid and the remaining fractions were liquid. Fraction 4 contained the maximum concentration of elaidic acid (having m.p. 45.5° C. and $n^{70}D$ 1.4401). Fraction 9 contained the maximum concentration of oleic acid (having I value 89.3 and $n^{35}D$ 1.4552).

Hydrogenated salmon-egg oil fatty acids, containing a large amount of C_{20} to C_{24} chain lengths, were distributed over 21 stages at 18° C. in a urea-saturated solvent consisting of equal volumes of

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ABSTRACTER: Edward H. Gruger, Jr.

4.61 FROZEN TROUT

Anonymous
Arsberetning fra Fiskeriministeriets Forsogslaboratorium for 1956 (Annual Report to the Danish Fishing Industry with English translation of the main experimental results) pp. 34-35 (1957) (Copenhagen, Denmark)

Fatty fish, for example trout, show, on being stored for a length of time, a tendency to take on a brownish discoloration and rancidity, especially if the temperature in the storage room is high. To counteract this rancidity, which must be considered as an oxidation effect resulting from the oxygen in the air, the Laboratory has made some research on commercial freezing of trout treated with a-scorbic acid. The Laboratory has previously worked with ascorbic acid when freezing,for instance, herring and salmon, but without positive results. Similar results have been obtained abroad.

One half of the trouts were dipped in a 1 percent ascorbic acid solution for 1 minute, before they were each packed in cellophane bags and placed in pairs in retail cartons, which were frozen and afterwards wrapped in cellophane. The other half were packed in the same way, without any treatment after washing.

After only a month's storage it could be seen from the tasting results that there was a definite difference between the ascorbic acid treated trout at -8° C. and the untreated at the same temperature. The latter were slightly yellow in the abdominal cavity and a little rancid, while those treated had no discoloration or off-flavors.

After a period of 3 months the difference in this group stored at -8° C. was more marked, and in the group stored at -18° C. a similar difference to the one found after a month's storage at -8° C. was found.

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4.91 THE EFFECTS OF DIFFERENT FOOD FATS ON SERUM CHOLESTEROL CONCENTRATION IN MAN

Anderson, Joseph T.; Keys, Ancel; and Grande, Francisco (University of Minnesota, Minneapolis)
The Journal of Nutrition 62, 421-444 (July 10, 1957)

Purpose. -- This paper reports on controlled comparisons of butterfat, corn oil, cottonseed oil, coconut oil, olive oil, sunflower seed oil, and sardine oil fed at levels of 30 to 35 percent of the total calories of a normal human diet.

Experimental design. -- From 16 to 28 selected schizophrenic men, maintained under rigidly standardized conditions in a state hospital, were used in each experiment. Four series of controlled experiments were carried out--each lasted for 3 to 6 months. Men were maintained on a control diet for a minimum of 4 weeks before the start of each experiment and on an experimental diet containing different kinds and amounts of fats for a maximum of 2 to 4 weeks during each series of experiments.

Experimental diets. -- A high-fat (35 to 41 percent) control diet and a low-fat (9 to 16 percent) experimental diet were used. All diets contained ordinary American foods. Menus were standardized and were adequate in calories, proteins, vitamins, and minerals. All experimental fats or oils were substituted isocalorically for carbohydrates in the low-fat (9 to 16 percent) diet.

Results. -- The low-fat diet alone consistently produced a significantly lower serum cholesterol level in men than the control diet, which contained an amount of fat that is ordinarily present in a United States diet. Olive oil or cottonseed oil substituted isocalorically for carbohydrates in the low-fat diet at a daily level of 50 grams produced a significant but not as marked decline in the serum cholesterol level in men as the low-fat diet alone.

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ABSTRACTER: Martin Heerdt

FATTY ACID ESTIMATION

UREA FRACTIONATION OF FATTY ACIDS

ASCORBIC ACID FOR TROUT

FATS VERSUS SERUM CHOLESTEROL

4.11

methanol and ethyl acetate. All of the fractions were solids except for the very small residues in fractions 17 through 20. Over one-third of the samples was found in fraction 0. Fraction 4 was stearic acid, fraction 7 was palmitic acid, and fraction 13 was mainly myristic acid. The identity of one other main fraction (no. 11) was unknown. The results of this experiment suggested that the saturated fatty acids with more than 18 carbons could be distributed more successfully at temperatures above room temperature, probably in the range 30° to 35° C.

Polyunsaturated fatty acids from salmon-egg oil were distributed over 18 stages at -30° C. in urea-saturated methanol. This experiment was exploratory and no attempt was made to characterize the products completely. In table 2 is given the refractive indices, iodine values and weight distribution of the separated fatty acids.

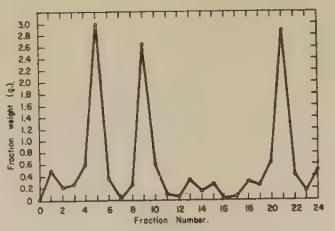

Fig. 2.--Distribution of a mixture of stearic, palmitic and oleic acids (5 g. each).

Table 2.--Refractive index

Fraction	Wt., g.	$n^{30}D$	I value	Fraction	Wt., g.	$n^{30}D$	I value
0	0.000	....		9	1.503	1.4762	302
1	.020	....		10	1.771	1.4835	341
2	.030	....		11	0.961	1.4865	
3	.021	....		12	2.143	1.4874	364
4	.035	1.4667		13	1.514	1.4890	
5	.096	1.4573		14	2.018	1.4890	358
6	.219	1.4588		15	1.078	1.4912	
7	.747	1.4632	206	16	0.518	1.4924	
8	.531	1.4702		17	0.124	1.4928	

4.91

The serum cholesterol level found in men that received a daily dietary level of 50 grams of olive oil substituted isocalorically for carbohydrate in the low fat diet was not significantly different than the serum cholesterol level found in men that received 50 grams of cottonseed oil. Cottonseed oil when fed isocalorically at a dietary level of 100 grams daily, however, did produce a slightly lower serum cholesterol level in men than did olive oil fed at the 100 gram level. The low-fat diet alone also tended to produce a lower cholesterol level in men than did olive oil fed isocalorically at a daily level of 100 grams. Corn oil fed isocalorically at a dietary level of 100 grams daily produced an even more marked decline in the serum cholesterol level of men than did cottonseed oil. Sardine oil and sunflower oil fed isocalorically also produced significant declines in the serum cholesterol level of men, but these oils were less effective than corn oil. Coconut oil fed isocalorically at a dietary level of 100 grams daily produced no significant change in the serum cholesterol level of men when compared with the control diet, which contained 100 grams of mixed fats. Butterfat fed isocalorically at a dietary level of 100 grams daily increased the serum cholesterol level of men when compared with the control diet.

Changes in the amount of cholesterol could be accounted for, within limits of error, by the cholesterol present in the beta-lipoprotein fraction.

Conclusions.--The serum cholesterol responses of the men to the various fats corresponded roughly to the principal that saturated fats promote higher cholesterol levels than polyunsaturated fats. The results obtained, however, were not fully explained by either the degree of saturation (iodine value) or the content of linoleic acid. Coconut oil was lower in cholesterol-promoting effect than would be predicted from its degree of saturation or its content of essential fatty acids. Conversely sardine oil was considerably lower in cholesterol-depressing effect than would be predicted from its degree of unsaturation. Corn oil, likewise in opposition to theory, produced a larger depression of serum cholesterol level than would be expected from either its content of essential fatty acids or its degree of unsaturation.

4.11

4.61

After 6 months a difference in the flavor of the ascorbic acid treated trout was also found in the -28° C. group.

It has been maintained by some scientific workers that ascorbic acid is not suitable for the treatment of fish, because the flavor of the acid can be objectionable. In order to investigate whether the flavor of the acid is perceptible after thawing and boiling, washed trout were dipped in a solution containing from 0.4% ascorbic acid. The tasting tests were made after 1 week and after 1 month's storage at -18° C.

The result was that the taste panel could not classify the fish according to degree of acidity, and therefore there should be no risk of affecting the flavor of trout with acidness by dipping in ascorbic acid solution.

4.92 STUDIES TO DETERMINE THE NATURE OF THE DAMAGE TO THE NUTRITIVE VALUE OF MENHADEN OIL FROM HEAT TREATMENT

Common, R. H.; Crampton, E. W.; Farmer, Florence; and DeFrietas, A. S. W. (McGill University, Province of Quebec, Canada)
The Journal of Nutrition 62, 341-347 (July 10, 1957)

A study was made to determine the nutritive value of a particular fraction of menhaden oil. This fraction consisted of the distillable ethyl esters that would not form urea adducts.

Experimental. -- A commercial alkali refined menhaden oil was used. This oil had the following characteristics: specific gravity 0.9251 at 25° C., refractive index 1.4784 at 25° C., iodine number according to Benham and Klee (1950) 180, saponification number 188, mean molecular weight (cryoscopic) 839, unsaponifiable 1.04 percent. This oil was heated in batches of 500 grams for 15 hours at 275° C. during which time a strong current of carbon dioxide was passed through the oil. The heated oil was then converted into its ethyl esters by trans-esterification in the presence of hydrochloric acid gas. The resulting esters were fractionated by means of urea adduct formation and distillation according to the method of Crampton et al. (1953). Six ester fractions were obtained. Ethyl esters of the untreated oil also were prepared by acid-catalyzed trans-esterification.

To measure their nutritive value, the esters of heated menhaden oil were fed to rats maintained on a basal diet. The percentage composition of the basal diet fed to the rats was as follows: ground whole wheat 54, dried skim milk 19, casein 12, dried yeast 3, dicalcic phosphate 1, iodized salt 0.5, ferrous sulphate 0.1, vitamin A and D supplement 0.15, and chromic oxide 0.25. Ground whole wheat was reduced from 54 to 44 percent when 20 percent ester fraction was fed. Each of the ester fractions were fed to a different group of 10 rats as supplements to the basal diet at both the 10 percent and the 20 percent level. Twelve groups of rats were used in all. In place of ester fraction

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 ABSTRACTER: Martin Heerdt

6.134 DIRECT ROTARY DRYERS

Anonymous
Norwegian Fishing News 4, 10-11 (1957) (Bergen, Norway)

Rotary dryers are applicable to the drying of relatively free-flowing granular materials. Materials that are not free-flowing in the wet condition must be handled by special devices such as premixing with a portion of the dried product, using a special flight construction by knockers on the side of the shell or by chains attached to the inside of the shell. Fine, dusty materials that tend to float in the air stream or solids that must meet exacting size standards are dealt with by special means.

A direct heat rotary dryer consists of a cylinder mounted upon suitable roller bearings serving as saddles that support each end of the dryer shell. The dryer shell is inclined slightly toward the discharge end. Wet material, fed into one end of the shell, progresses through the cylinder due to the rotation and slope of the cylinder until it is discharged as dry material at the other end. The feed end of the steel cylindrical shell is conical to prevent material from falling back out of the rotating shell. The shell, if large, is usually circled at each end by cast steel machined-true rings which bear upon the roller bearings mounted in the two saddles. The number of bearings and spread of the rollers are dependent upon the diameter of the dryer shell. Small dryer shells are driven by a chain which simply circles the dryer cylinder. Flights on the inside of the shell are designed to best handle the specific material being dried. Granular materials that would readily fall off the flights at a low point in its travel are handled by flights having upturned lips to carry the material higher in the circular path. Sticky materials have flights inclined downward, or a negative slope. Materials that change characteristics during drying require a flight design that changes in passing through the shell. Cross members are sometimes used in large dryers to control air currents and material distribution. Discharged material enters an elevator and is conveyed to the next step in

(over)

 ABSTRACTER: Lynne G. McKee

6.132 TECHNICAL NOTE NO. 38. -- A PORTABLE FISH-MEAL BLENDER FOR PILOT-PLANT USE

McKee, Lynne G. (U. S. Fish and Wildlife Service, Seattle 2, Washington)
Commercial Fisheries Review 19, 16-17 (June 1957)

A portable fish-meal blender was constructed recently by the Seattle Technological Laboratory in order to simplify the mixing and sampling of experimentally produced meals in quantities up to 200 pounds.

As shown in the illustrations,(see over), the vertical worm-type blender, used in some commercial units on a larger scale, was adapted for laboratory purposes. The unique features of the modified blender design are the use of a light, strong, funnel-shaped hopper mounted on a wheeled base for portability and a gearhead motor drive located at the base of the unit for safety and convenience of access to the hopper.

Meal, when placed into the hopper for blending, is conveyed from the bottom of the hopper upward to the surface of the meal where the rotating worm throws it tangentially against the sloping sides of the hopper. A cavitiy is created, at the bottom of the hopper in the neighborhood of the screw, which is continuously refilled by the movement of the meal downward along the sloping sides of the hopper. The blended material is removed through a sliding door at the base of the hopper. Laboratory tests in which a dye tracer was added to a 100-pound batch of meal showed that thorough mixing of all components in the meal required approximately 10 minutes.

The blender consists of five main elements: (1) a funnel-shaped hopper 48 inches high with a 26-inch diameter at the top and tapering to a 6-inch diameter at the base; (2) a vertical helical worm 48 inches long and 6 inches in diameter; (3) two shaft bearings consisting of a top radial bearing and a tapered roller bearing at the base; (4) a ½-horsepower gearhead motor drive; and (5) a double-decked caster-mounted dolly of 1-inch thick plywood to carry the assembly. The 12-inch space between the decks on the dolly provide space for the gearhead motor which drives the vertical worm at 250 r.p.m.

(over)

 ABSTRACTER: Lynne G. McKee

7.8 TECHNICAL NOTE NO. 39 -- FROZEN TUNA SAMPLER

McKee, Lynne G. (U. S. Fish and Wildlife Service, Seattle 2, Washington)
Commercial Fisheries Review 19, 7-9 (July 1957)

A motor-driven device designed to obtain samples from frozen tuna for the subsequent determination of salt content has been developed at the Seattle Technological Laboratory of the U. S. Fish and Wildlife Service.

Construction. --The frozen tuna sampler is powered by an electric-drill motor and consists of a core-drill tube and an arbor. See figures 1 and 2 (over). The core-drill tube is of thin-wall steel tubing with a ⅜-inch inside diameter and a length of 7½ inches. The dimensions can be altered, however, to produce any size core desired. The tubing is of steel so that the teeth may be case-hardened. Teeth are filed on one end of the tubing with the cutting edge of the teeth facing in the direction that the electric drill rotates. Each alternate tooth is set slightly inward to cut a core smaller than the inner diameter of the core drill. The remaining teeth are set slightly outward to clear a path for the tubing.

The core drill is held in the electric drill by means of an arbor that has a 3/8-inch shank on one end to fit into the chuck of the electric drill, and has a pilot turned on the opposite end to carry the core drill. A pin is fitted through the pilot and, by projecting just the thickness of the tubing on each side of the pilot, provides a quick on-and-off locking device. The tubing is slotted to fit over the pin so that an eighth of a turn of the tubing will allow the core drill to be withdrawn from the pilot.

Operation. --The drill must be held firmly and pushed smoothly as it enters the meat to obtain a core. When the desired depth of core is reached, the drill is held stationary, and the friction between the inner wall of the tube and the core is sufficient to hold the core while it is broken loose and removed. The core may be removed either by dipping the core drill into hot water for a moment and shaking, or by being pushed out with a small wooden plunger.

See illustrations, over.

(over)

 ABSTRACTER: Kathryn L. Osterhaug

TOXICITY OF HEATED FISH OIL

PILOT-PLANT MEAL BLENDER

ROTARY MEAL DRYERS

FROZEN TUNA SAMPLER

6.132

The unit is constructed to allow the use of a tight cover when desirable during the mixing period.

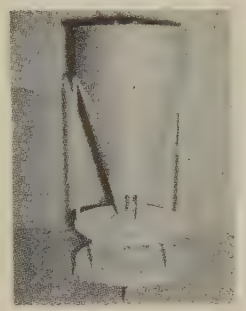

FIG. 1 - THE PORTABLE FISH-MEAL BLENDER, SHOWING THE SLIDE AT THE BASE FOR REMOVAL OF THE MEAL AFTER MIXING.

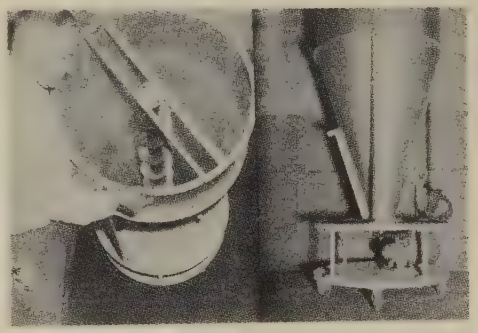

FIG. 2 - A DOWNWARD VIEW OF THE MEAL BLENDER, SHOWING THE 6-INCH DIAMETER HELICAL WORM.

FIG. 3 - THE LOWER PART OF THE MEAL BLENDER, SHOWING THE ½-HORSEPOWER GEARHEAD MOTOR DRIVE.

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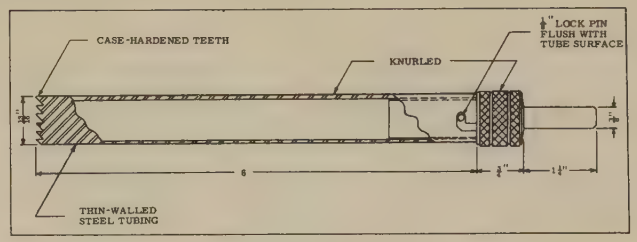

FIG. 1 - FROZEN TUNA SAMPLER.

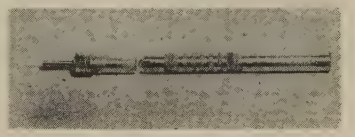

FIG. 2 - FROZEN TUNA SAMPLER.

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number 6, the ester of whole menhaden oil was fed both at the 10 and 20 percent level. All diets were offered ad libitum.

Results.--The results were predicated on survival, food intake, live weight gain, digestibility of the ester extract, and gain per 1000 digested calories. Comparable data were obtained from feeding similar fractions from heated linseed oil. The non-adduct-forming fraction of the distillable esters from heated menhaden oil was toxic to rats in a degree that was comparable with the toxicity of similar fractions from linseed oil. The adduct-forming fraction of the distillable esters from heated menhaden oil was nutritionally nontoxic. Additional evidence is provided by these results for the existence of a relationship between the toxicity of the non-adduct-forming fraction and the presence of polyene acids in the original oil.

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processing. Exhaust fans pull the gases through the shell and pass them on to a cyclone, or other means of dust collection. Bag-type collectors are used following the cyclone to trap expensive dust. Insulation of collectors is important in order to stop condensation. Water-spray scrubbers following cyclone or dust collectors remove toxic fumes.

High temperature dryers use a combustion chamber for thorough mixing of hot gases. For low temperature drying, steam coils give best results. Temperature may be controlled by the volume of entering air. Where contamination of a product by entering air is possible, indirect dryers are used. Hot gases may travel with the flow of material or counter to material flow and may be forced through the dryer by means of a blower or by the use of an exhaust fan. In the former case, dust may be forced out through small vents and cracks in the dryer-shell and cause dusty working conditions. If an exhaust fan is used cold air may be sucked into the shell and decrease effective drying temperature.

Gas-, oil-, and coal-fired dryers will evaporate from 30 to 200 kg. of water per hour per cubic meter of dryer volume. Steam-heated dryers will evaporate from 3 to 40 kg. per cubic meter of Thermal efficiencies of high temperature dryers will run from 55 to 80 percent; and of low temperature dryers, from 30 to 60 percent.

Drying processes may be divided into three stages: (1) heating wet material to a constant surface temperature approaching the wet bulk; (2) drying at this constant temperature; and (3) removing the last traces of moisture by raising the temperature of the material. The evaporation capacity of a dryer and its thermal efficiency depends upon heat transferred to the material in each of the three zones and the entering and exit gas temperatures.

Efficient operation depends upon the constant flow of wet material to the dryer, the uniform moisture content of the material, and upon uniform temperatures of the gases. Automatic controls may be utilized to maintain uniformity of these several factors. Yearly maintenance costs will run from 5 to 10 percent of the installation cost.

7.81 A RAPID METHOD FOR THE ESTIMATION OF VOLATILE BASES IN FISH MUSCLE

Montgomery, W. A. (Division of Food Preservation and Transport, C.S.I.R.O., Homebush, N.S.W., Australia)
Fish Processing Technologists Meeting Symposium (FAO) paper No. 20, (June 1956) (Rotterdam)

Introduction. --A modified Conway procedure that eliminates the use of a buret was developed to provide a rapid method for field use. The method is based on a measurement of the absorption time for volatile bases in the outer chamber of a hand-rocked Conway unit to neutralize a fixed amount of acid in the inner chamber. Acid concentrations ranging from 0.0002 N to 0.0027 N using 0.2 gram samples gave satisfactory results in a matter of minutes.

Procedure. -- Five grams of fish muscle are ground with 5 milliliters of a 20 percent solution of trichloracetic acid, filtered, washed with portions of distilled water, and diluted to 17.5 milliliters. Seven milliliters of the extract are treated with 0.7 milliliter of 36 percent formaldehyde solution (for TMA), neutralized with potassium hydroxide to pH 5 to 6 and diluted to 10 milliliters. One-half milliliter of the standard acid containing an indicator changing color at pH 5.4 is placed in the center chamber, and one milliliter of the extract is placed in the outer chamber. The dish is covered with a clear glass plate and rocked to give a swirling motion to the liquids at a rate of 30 times per minute. Absorption times ranged up to two minutes.

Absorption rates depend on a slow, uniform shaking procedure and increase in importance as the concentration is increased. Increasing the temperature from 15 to 30 degrees centigrade reduced the absorption time by as much as 40 percent. This is clearly shown by tables and graphs. Figure 1 (omitted) shows the concentration of base plotted against absorption time on a log-log scale, for trimethylamine at 20 degrees centigrade. Graphs can be made for other temperatures and other bases and interpolations made for intermediate values. The absorption rate is affected by the presence of

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ABSTRACTER: Claude Thurston

8.6 INVESTIGATION OF SHARK LIVER RESIDUE. DETERMINATION OF B-VITAMINS AND PREPARATION OF PROTEOLYZED EXTRACTS

Rajagopalan, K. V. and Sarma, P. S. (Univ. Madras)
J. Sci. Ind. Research (India) 15C, 227-31 (1956)
Chemical Abstracts 51, 6896 (May 10, 1957)

Liver residue remaining when most of the oil has been removed and the aqueous layer discarded was dried at 55°, extracted fat-free in a Soxhlet, dried, and powdered. Proteolyzates of the residue were made using papain and pancreatin. Vitamin assays were made microbiologically.

The total N content of the liver residue varied from 108.4 to 117.4 mg./g. and for oil-free whole liver from 124.2 to 131.7 mg./g. Papain digestion was complete in 144 hr. and pancreatin digestion in 168 hr., the former yielding a product containing 36.05% total solids, 4802 mg. total N, and 1628 mg., free-amino N while the latter yielded a product containing 25.95% total solids, 4432 mg. total N, and 1420 free-amino N.

The vitamin content of four samples of liver residue, two samples of whole liver residue (no water added when heated to separate oil), papain digest, and pancreatin digest were, respectively, in γ/g. dry wt.: thiamine 2.10-2.80, 5.43-6.15, 8.45, and 6.93; riboflavine (Lactobacillus casei) 27.90-36.35, 49.30-50.20, 71.20, and 69.20; riboflavine (fluorimetry) 28.40-35.06, 46.37-48.30, 74.30, and 66.30; nicotinic acid (Lactobacillus arabinosus) 67.50-77.20, 91.70-97.20, 192.50, and 171.70; nicotinic acid (chemical) 69.20-76.90, 90.40-101.30, 189.20, and 174.00; vitamin B_6 11.17-12.90, 17.80-18.33,38.20, and 31.50; pantothenic acid 31.70-43.00, 71.30-81.70, 112.30, and 98.50; biotin (Lactobacillus arabinosus) 1.76-3.11, 4.23-4.41, 8.61, and 7.80; biotin (Neurospora crassa) 1.94-3.33, 4.09-4.26, 8.53, and 7.75; folic acid (L. casei) 2.65-2.91, 4.98-5.44, 13.51, and 11.94;

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Reprinted in whole

7.89 BASIC PRINCIPLES AND INSTRUMENTATION. II. VISCOSITY AND CONSISTENCY

Kramer, Amihud and Twigg, Bernard A.
The Canner and Freezer 124, 11-14 (June 24, 1957)

The following descriptions of the types of instruments for measuring viscosity are continued from the May 27, 1957 issue.

Torsion. -- Some instruments are operated on the principle of torque exerted by the test material as it rotates about a stationary spindle. Examples of this type of instrument are the MacMichael viscometer, the Fisher Electroviscometer, and the Food Machinery and Chemical Corporation Consistometer.

Power consumption. -- The consistency of plasticity of a product can also be determined by recording the total power necessary to drive a mixer or other type shearing instrument a certain number of revolutions. The Brabender Farinograph operates on a principle similar to this and is widely used in the cereal and baking industry.

Penetration into test material. -- Several viscosity measuring devices are based on the degree of penetration of a blunt instrument into the material being tested. Examples of this type are the Bloom Gelometer and the Penetrometer.

Spread or flow of material. -- The degree of spread or flow of a material in a given period of time is the principle involved in some widely used consistometers for plastic-like products such as applesauce and cream style corn. The Bostwick Consistometer, the Adams Consistometer, and the

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ABSTRACTER: Richard W. Nelson

9.4 TUNA PACKING AT PONCE

Anonymous
Pacific Fisherman 55, 8-16 (July 1957)

In 1956, a West Coast tuna packer expanded its tuna packing operations by the purchase of a plant at Ponce, Puerto Rico. The plant was immediately enlarged and modernized to the point where it is now outstanding in many respects.

The question as to why Puerto Rico was selected as the site of a modern tuna plant is clear when several factors are considered. Puerto Rico has a strategic position in the tuna fishing areas. It is nearer to the South American west coast fishing grounds than are the California fishing ports. The east coast of South American and the Caribbean are within efficient fishing distance. Also, the Gulf of Mexico has latent possibilities as a producer of yellowfin and other species of tuna. Puerto Rico is in the path of steamship lines servicing the Orient and South America and thus has favorable freight rates. Under the United States Government, Puerto Rico has the status of a Commonwealth which provides distinct advantages over the state or territorial government. As a Commonwealth, Puerto Rico can allow tax benefits which will attract industries to the island. For instance, profits for ten years are exempt from U. S. income taxes as long as they are employed to amortize the investment or are plowed back into development. Labor supply is ample and efficient. Wage scales, while not low, are less than in the United States.

The modernization included a new 500-ton cold storage plant in addition to the original 250-ton facilities. The new cold storage is of unique design. Essentially, it is a cork insulated concrete box. Aside from the main door all other openings are on the roof and are built like the hatch covers on a fishing vessel. A monorail track circles the roof and is spotted directly over the hatches.

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ABSTRACTER: Lynne G. McKee

VOLATILE BASE DETERMINATION

VISCOSITY AND CONSISTENCY MEASUREMENTS

B-VITAMINS FROM LIVER RESIDUE

TUNA CANNING IN PUERTO RICO

7.89

Cream Corn Meter are examples of instruments operating on this principle.

Ultrasonic vibration. --The principle of this type of meter is in the damping of a vibrating reed when the reed is immersed in the material being tested. A magnetostrictive sensing element transmits the signal reduction and produces a reading on the instrument.

Radioactive density gages. -- Viscosity measuring devices have been developed which operate on the principle that gamma rays passing through a material are absorbed proportional to the density of the material.

Continuous viscosity measurements. -- Various instruments are available which continuously record viscosity. These use the same principles as the meters described above but record the readings automatically.

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Incoming fish, loaded into fish carts, are moved to the proper hatch. The cart is then lowered to the floor within the cold storage. A crew unloads the cart, piling the fish into compartments against the walls. Fish are stacked no more than 3 feet deep. A cover is then placed over the fish and a new compartment of fish is built above the lower one. This system is continuous to the ceiling. Using the 3 foot compartments there is no danger of crushing the fish and also better circulation of air is secured. Unloading is from the front end of the compartments into a cart held at the proper height by a fork lift truck.

Fish receiving, dressing, and washing facilities were removed to an open air area outside the plant. Precook retorts and cooling area was moved to the outside and located in line with the receiving and dressing area. Two new precookers were added to the original four precookers. Processing retorts were also moved outside the cannery building and a new retort added to the original five. To facilitate cooling of precooked fish in the hot weather a special room was added which provides humidified and chilled air. An additional canning line was added. The six lines are fitted with filling machines and high speed seamers. Salters, oil heaters, and can supply to lines are all thoroughly modern. The plant is cooled by an air blast system.

The plant is so planned that tuna from various sources can be handled with efficiency. Clipper boat fish may be diverted into three channels: (1) held in open air for defrosting and immediate canning, (2) diverted to a chill room for slower defrosting, or (3) sent to the cold storage and held for future use.

7.81

added constituents in the fluid of the outer chamber. Preparation of the extract with alcohol instead of trichloracetic acid reduced the rate of release of TMA but had little effect on ammonia. Alkalis other than potassium carbonate retarded the release of TMA and in some cases of ammonia also. Trimethylamine oxide, a natural constituent in the flesh of salt water fish, had no effect on volatility or absorption rates for the three bases.

A detailed discussion is given for the preparation and use of the graphs.

8.6

folic acid (Streptococcus faecalis R) 2.57-2.78, 4.83-5.12, 13.05, and 11.70; vitamin B_{12} 0.1097-0.132, 0.3131-0.3371, 0.3470; and 0.2922; choline 790-1490, 4490-5900, 7930, and 6220; and inositol 759-860, 1286-1488, 5420, and 4330.

Aqueous extraction of oil results in loss of water soluble vitamins in the discarded aqueous layer.

1.81 TECHNICAL NOTE NO. 34 - GROWTH CHARACTERISTICS OF THE PINK YEAST THAT CAUSES DISCOLORATION OF OYSTERS

McCormack, Grace
Commercial Fisheries Review 18, 21, 22 (November 1956)

(Abstract of this article appears under 0.5 page 1 - May 1957)

1.81 APPLICATION OF THE THIOBARBITURIC ACID TEST AS A QUANTITATIVE MEASURE OF DETERIORATION IN COOKED OYSTERS

Schwartz, Mark G. and Watts, Betty M.
Food Research 22, 76-81 (January-February 1957)

(Abstract of this article appears under 7.879 page 19 - June 1957)

1.81 EFFECT OF IONIZING RADIATIONS ON SOUTHERN OYSTERS

Gardner, Elizabeth Ann and Watts, Betty M.
Food Technology 11, 329-331 (June 1957)

(Abstract of this article appears under 3.19 page 5 - November 1957)

1.89 STUDIES ON THE CHARACTERISTIC ODOR OF SQUID II. ON THE MOTHER SUBSTANCE AND SUPPRESS OF THE CHARACTERISTIC BOILED SQUID ODOR

Yamanishi, Tei; Yamashita, Sachiko; Yamazaki, Akiko; and Tokue, Yoko
Bulletin of the Japanese Society of Scientific Fisheries 22, No. 8, 480-485 (1956) (English synopsis and tables)

The characteristic odorous substance (sulfur containing amine with piperidine nucleus) was formed when water extract of squid meat was boiled, but it was not formed from skin nor non-protein extract of the meat. From non-protein extract only trimethylamine and ammonia were produced.

1.89 THE FREEZING AND COLD STORAGE OF RAW CRAYFISH

Anderson, K. W.
Food Preservation Quarterly 16, 69-71 (December 1956)

(Abstract of this article appears under 3.239 page 11 - June 1957)

1.953 THE COMPOSITION AND NUTRITIVE VALUE OF WHALE MEAT

Merino, A. Santos
10th Congr. intern. inds. agr. y aliment., Madrid 349-53 (1954) (English summary)
Chemical Abstracts 50, 15983 (November 10, 1956)

Whale meat from Spanish factories showed the following compn.: H_2O 69.3, total protein 24.4 lipides 5.0, ash 0.9%; P (as phosphate) 49.71, K 27.33, Na 9.67, Cl 6.22, Mg 2.39, Ca 1.22, S (as sulfate) 0.69% of ash. The energy value was 146.5 cal./100 g.

1.953 A PICTURE STUDY OF AN AMERICAN WHALING OPERATION

Sanford, F. Bruce (Fishery Technological Laboratory, U. S. Fish and Wildlife Service, Seattle 2, Washington)
Commercial Fisheries Review 19, 1-8 (May 1957)

The whaling industry, long a romantic tradition in America, still exists in this country. This paper presents a pictorial study of modern inshore whaling operations.

2.111 RESISTANCE OF PLANE NET AGAINST FLOW OF WATER

Nomura, Masatsune and Mori, Keishiro
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 11, 1110-1113 (1956) (English abstract, table, and figures)

III. Effect of kind of fibers on the resistance of net.--The coefficient of water resistance is greatly affected by roughness on the surface of the netting cord.

2.111 NETTING AND ITS SECRETS (16) FIFTH ROW TAPERING AND PAIR CUTTING

Jeffs, F. E.
World Fishing 6, 62, 63, 66 (January 1957)

2.111 DIFFERENCES ON THE FREQUENCY OF TRANSFER OF FISHES AMONG SEVERAL KINDS OF COLORS FOR UNDER-WATER FENCING NET

Hiyama, Yoshio; Kusaka, Takaya; and Kondo, Keikichi
Bulletin of the Japanese Society of Scientific Fisheries 22, No. 10, 598-601 (1957) (English abstract, figures, and tables)

This experiment regarding influences of colors of fish net, was performed in order to observe the frequency of transfer of fishes over several models of fencing net in a center tank.

2.1127 REACTION OF TUNAS TO STIMULI, 1952-53. PART 1: RESPONSE OF TUNA TO CHEMICAL STIMULI. PART 2: RESPONSE OF TUNA TO VISUAL AND VISUAL-CHEMICAL STIMULI

Tester, Albert L.; van Weel, P. B.; Naughton, John J.; and Hsiao, Sidney C.
Special Scientific Report: Fisheries No. 130 (March 1955) United States Department of the Interior, Fish and Wildlife Service, Washington, D. C.

(Abstract of this article appears under 1.10 page 1 - November 1955)

2.1127 FISHERY BYPRODUCTS RESEARCH

Anonymous
Commercial Fisheries Review 18, 8-11 (October 1956)

(Abstract of this article appears under 6.130 page 21 - April 1957)

2.118 FACTORS THAT AFFECT FREEZING

Anonymous
Report of the Food Investigation Board (Great Britain) for 1954, pp. 36-40 (1955)

(Abstract of this article appears under 3.234 page 7 - July 1957)

2.118 ON THE QUESTION OF FREEZING FISH AT SEA

Kuprianoff, J. (Federal Research Institute for the Keeping of Foodstuffs, Karlsruhe, Germany)
Freezing Technology 8, Notebook 4, 114-121 (1956)

Economic factors which influence the quality of fresh fish brought to land are discussed, and the interest in fish frozen at sea is justified. The most recent developments in the field of freezing ships and experimental ships are described in detail and the factors determining the profitableness of freezing ships are discussed.

3.12 FRESH FISH 7. FISH FOR PET FOOD

van der Merwe, R. P.
Annual Report Fishing Industry Research Institute, Cape Town, South Africa 9, 10 (1955-1956)

Sodium benzoate was added to four portions of minced raw fish at the rate of 0, 192, 770, and 3,068 p.p.m. to prolong storage. The portions then were spread evenly on large plates, covered, stored at 60° F., and examined for freshness at regular intervals. Portions 1, (untreated), 2, 3, and 4 kept, respectively, for 12, 24, and 36 hours. Untreated minced fish (with skin) and fish shavings kept respectively, for 24 and 96 hours at 40° F. Minced fish and fish shavings both with 770 p.p.m. of sodium benzoate kept, respectively, for 96 and 144 hours.

3.12 PENETRATION OF CHLORTETRACYCLINE INTO FISH FLESH OR ROUND FISH AND ITS HEAT INACTIVATION

Tomiyama, Tetuo; Yone, Yasuo; and Mikajiri, Kazuo
Bulletin of the Japanese Society of Scientific Fisheries 22, No. 12, 778-783 (1957) (English synopsis, figure, and tables)

3.12 SPOILAGE OF FISH AND ITS PRESERVATION BY CHEMICAL AGENTS

Tomiyasu, Yukio and Zenitani, Buhei (Kyushu University, Fukuoka)
Advances in Food Research (Academic Press Inc., New York, N. Y.) 7, 41-82 (1957)
Chemical Abstracts 51, 6025b (April 25, 1957)

3.249 TACHYPEXIS (QUICK-FREEZING) APPLIED TO THE PRESERVATION OF MEAT. III. DIGESTIBILITY AND BIOCHEMICAL CHANGES OF MEAT FROZEN AND STORED AT -25° C. AND -40° C. FOR 48 MONTHS

Monzini, A. and Lissoni, A.
Ann. Sper. agr. 9, 1093-1106 (1955) (Summary in English)
Food Science Abstracts 28, 247 (June 1956)

The changes in frozen veal and beef, stored at temperatures of -25° and -40° C. for 10 and 48 months, were studied.

3.249 PACKAGING IS BULWARK OF FROZEN FOOD QUALITY

Klein, Marian G.
Frosted Food Field 23, 25-26 (July 1956)

(Abstract of this article appears under 3.238 page 15 - February 1957)

3.4 FRESH FISH 6. OIL SMOKING OF HAKE FILLETS

Dreosti, G. M. and van der Merwe, R. P.
Annual Report Fishing Industry Research Institute, Cape Town, South Africa 9, pp. 10 (1955-1956)

Skinned hake fillets from five medium sized hake were divided into two lots. Fillets in lot 1 were completely immersed momentarily in oil that had been smoked for 8 hours, suspended from a rack, and allowed to drain for 5 to 10 minutes until dripping stopped. The fillets in lot 2 were merely suspended from a rack. The fillets in lot 1 gained an average of 0.6 percent in weight; whereas the fillets in lot 2 lost an average of 1.2 percent in weight. Fillets from both lots were then fried in oil both before and after freezing. The dipped fish had acquired a mild and pleasant smoked flavor.

3.4 USE OF ANTIOXIDANT IN PAPERBOARD

Doyle, M. E.; Sullivan, R. D.; and Booth, H. G.
Modern Packaging 29, 119-123, 195 (July 1956)

(Abstract of this article appears under 3.238 page 13 - February 1957)

3.4 IMPROVING QUEBEC'S BLOATER INDUSTRY

Anonymous
Canadian Fisherman 44, 12, 14, 28-29 (February 1957)

4.13 THE LIPIDES OF FISH. 8. THE TRIGLYCERIDES AND CHOLESTEROL ESTERS OF HADDOCK FLESH

Lovern, J. A.
The Biochemical Journal 63, 373-380 (July 1956)

(Abstract of this article appears under 8.53 page 23 - March 1957)

4.13 LIPIDS OF THE MUSCLE OF TUNA (THUNNUS ORIENTALIS)--I. ACETONE-SOLUBLE LIPID OF THE ORDINARY MUSCLE

Igarashi, Hisanao; Zama, Koichi; and Katada, Muneo
Bulletin of the Japanese Society of Scientific Fisheries 22, No. 12, 787-790 (1957) (English synopsis and tables)

4.13 LIPIDS OF THE MUSCLE OF TUNA (THUNNUS ORIENTALIS)--II. ACETONE-SOLUBLE LIPID OF THE DARK-COLORED MUSCLE

Igarashi, Hisanao; Zama, Koichi; and Katada, Muneo
Bulletin of the Japanese Society of Scientific Fisheries 22, No. 12, 791-795 (1957) (English synopsis and tables)

4.2 STUDIES ON THE OIL OF YELLOWTAIL, SERIOLA QUINQUERADIATA

Tsuyuki, Hideo and Okuno, Minoru
Bulletin of the Japanese Society of Scientific Fisheries 22, No. 8, 490-499 (1956) (In English)

I. On the oil of ordinary and red meat.
II. Properties of oil contained in various parts of some samples caught in April.

4.2 CHEMICAL CHANGES WHICH TAKE PLACE IN AN EDIBLE OIL DURING THERMAL OXIDATION

Johnson, O. C. and Kummerow, F. A. (University of Illinois, Urbana)
Journal of the American Oil Chemists' Society 34, 407-409 (August 1957)

The thermal oxidation of corn oil at 200° C. proceeds in two steps, an initial period of 12 to 16 hrs., characterized by a decrease in iodine value and a rapid increase in carbonyl value, and a second phase in which a slower decrease in iodine value, a slight decrease in carbonyl value, and a rapid increase in viscosity occurred. Increasing the rate of aeration caused greater magnitude in changes but did not alter the over-all two-phase reaction.

4.92 ROLE OF VITAMIN E (α-TOCOPHEROL) IN POULTRY

Ames, Stanley R. (Distillation Products Industries, Rochester, New York)
Poultry Science 35, 145-159 (January 1956)

(Abstract of this article appears under 5.7 page 11 - November 1956)

4.92 CHANGES OCCURRING IN EDIBLE FATS AND OILS DUE TO HEAT DURING COOKING

Jaschik, S. and Kramer, M.
Elelmez. Ipar, Budapest 7, 17-25 (1953)
Food Science Abstracts 29, 235-236 (June 1957)

4.92 STUDIES TO DETERMINE THE NATURE OF THE DAMAGE TO THE NUTRITIVE VALUE OF SOME VEGETABLE OILS FROM HEAT TREATMENT. IV. ETHYL ESTERS OF HEAT-POLYMERIZED LINSEED, SOYBEAN AND SUNFLOWER SEED OILS

Crampton, E. W.; Common, R. H.; Pritchard, E. T.; and Farmer, F. A.
J. Nutrit. 60, 13-24 (1956)
Food Science Abstracts 29, 235 (June 1957)

LIST OF PUBLICATIONS REGULARLY ABSTRACTED

Analyst
Analytical Chemistry
Archives of Biochemistry and Biophysics
Biochemical Journal
Bulletin of the Faculty of Fisheries, Hokkaido University
Bulletin of the Japanese Society of Scientific Fisheries
California Fish and Game
Canadian Fisherman
Canadian Journal of Chemistry
Canadian Journal of Technology
Canner and Freezer
Chemical Abstracts
Chemical and Engineering News
Chemical Engineering
Chemical Processing
Chemistry and Industry
Commercial Fisheries Review
Drug and Cosmetic Industry
FAO Fisheries Bulletin
Federation Proceedings
Feed Bag
Feedstuffs
Fisheries Newsletter (Australia)
Fish. Res. Bd. Can., Prog. Repts. Atlantic Coast Stas.
Fish. Res. Bd. Can., Prog. Repts. Pacific Coast Stas.
Fishing Gazette
Food Engineering
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Food Packer
Food Preservation Quarterly
Food Processing
Food Research
Food Science Abstracts
Food Technology
Frosted Food Field
Gourmet
Industrial and Engineering Chemistry
Industrial Refrigeration
Institutions
Journal of Agricultural and Food Chemistry
Journal of Applied Chemistry
Journal of Biological Chemistry
Journal of Nutrition
Journal of Organic Chemistry
Journal of the American Chemical Society
Journal of the American Dietetic Association
Journal of the American Oil Chemists' Society
Journal of the Association of Official Agricultural Chemists
Journal of the Chemical Society (London)
Journal of the Fisheries Research Board of Canada
Journal of the Science of Food and Agriculture
Maine Coast Fisherman
Modern Packaging
Modern Refrigeration
National Fisherman
National Provisioner
Nature
Nutrition Reviews
Pacific Fisherman
Pan American Fisherman
Poultry Science
Practical Home Economics
Progressive Fish-Culturist
Quick Frozen Foods
Refrigerating Engineering
Report of the Food Investigation Board (Great Britain)
Science
Southern Fisherman
Trade News (Fisheries Department, Canada)
Western Fisheries
World Fisheries Abstracts
World Fishing

Articles chosen for abstracting or inclusion as bibliographical references are those deemed of interest to the commercial fisheries and to fishery technological laboratories. Occasionally pertinent articles from sources other than the above listed publications are included. Biological papers are generally omitted.

- - -

Editorial Clerk (Typist)--Gladys K. Chandler

6.197 MINERAL BALANCE

Halloran, Hobe (Feed Science)
Western Feed and Seed 11, 48 (July 1956)

Poultry mineral balance has a tremendous effect on feed efficiency. The vitamins can be added easily, but the calcium and phosphorus content must be watched constantly. The approximate pounds of bone meal in two types of fish meal and two kinds of meat scrap are:

Protein	Material	Lbs. bone meal per 100 lbs.
60%	Fish meal	26
72%	Fish meal	11
45%	Meat scrap	46
55%	Meat scrap	33

6.237 PREPARATION OF ETHYL MORRHUATE FROM COD-LIVER OIL

Palestrino, Renato and Guitian, Ramon (Lab. humanitas, S.A., Sao Paulo, Brazil)
Ion 15, 478-9 (1955)
Chemical Abstracts 50, 5993 (April 25, 1956)

6.237 STUDIES ON THE ECONOMICAL MANUFACTURE OF VITAMIN A CONCENTRATE FROM FISH LIVER OIL VII. ESTERIFICATION OF VITAMIN A CONCENTRATE

Higashi, Hideo and Kinumaki, Toyosuke
Bulletin of the Japanese Society of Scientific Fisheries 22, No. 8, 500-503 (1956) (English synopsis)

6.3 STUDIES ON THE ANTISEPSIS OF AGAR DURING THE MANUFACTURING PROCESS IN THE MILD WINTER. I. ON THE EFFECTS OF ANTISEPTICS ON AGARASE

Fujisawa, Hiroaki and Sukegawa, Terutake
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 1, 30-34 (1956) (English abstract, table, and figures)

The spoilage of agar is due to the activity of putrefactive bacteria and to the activity of the agarase enzyme from agar-decomposing bacteria in particles. Sodium hypochlorite inhibited the activity of agarase at a concentration of 0.01-0.1 percent as available chlorine. The inhibitory effects of dehydroacetic acid is entirely due to a lowering of the pH.

6.3 HOW IRISH MOSS EXTRACTIVE IMPROVES PROTEIN-CONTENT FOODS

Glabe, Elmer F.; Goldman, Pauline F.; and Anderson, Perry W. (Food Technology, Inc., Chicago)
Food Engineering 29, 65-67 (January 1957)

Irish moss extractive has shown success in extending mixing tolerances of bread doughs, firming spaghetti, enhancing white cakes, protecting bean hulls, suspending cocoa in chocolate milk, and producing dry icings.

6.72 STUDIES ON THE UTILIZATION OF PYLORIC CAECA OF SKIPJACK

Kakimoto, Daiichi; Mizuma, Hiroshi; and Yoshimine, Tetsuro
Bulletin of the Japanese Society of Scientific Fisheries 22, No. 5, 316-323 (1956) (English synopsis, tables, and figures)

6.72 THE BILE ACID OF COD BILE

Dugal, L. C. and Laframboise, A.
Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations, No. 65, 21-23 (October 1956)

(Abstract of this article appears under 8.59 page 15 - July 1957)

6.72 INDUSTRIAL METHOD OF TRYPTOAMINE SULFATE PRODUCTION FROM STURGEON FISH MILTS

Karaev, A. I.; Aliev, R. K.; Osina, E. E.; Gauzer, E. G.; and Igonets, G. Ya
Izvest, Akad. Nauk Azerbaidzhan. S.S.R. No. 1, 101-10 (1957) (in Russian)
Chemical Abstracts 51, 11608-11609 (August 10, 1957)

Treat 100 kg. of the dry and degreased powder of milts by stirring with 300 l. 5 % H_2SO_4 in an enameled extractor. After 3 hrs. centrifuge and ext. the residue again with 150 l. 3% H_2SO_4 for 1.5 hrs.; sep. the ppt. by pressing. To the total ext. add EtOH in the ratio 1:4, stir 30 min., let settle for 2-3 hrs., and decant the alc. Dissolve the ppt. in 100 l. H_2O, heat to boiling, ppt. with alc., remove EtOH, dissolve in 50 l. distd. hot H_2O, add NH_3 to pH 8-9, and filter. Treat the filtrate with alc., filter, wash with alc., and then with Et_2O, and dry at 80°.

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8.0 COMPOSITION OF SOUTHERN OYSTERS

Lee, Charles F. and Pepper, Leonard
Commercial Fisheries Review 18, 1-6 (July 1956)

(Abstract of this article appears under 1.81 page 3 - March 1957)

8.0 FAT AND WATER CONTENT IN THE EDIBLE PORTION OF THE ROSEFISH (SEBASTES MARINUS)

Brandes, C. H. and Dietrich, R. (Inst. Meeresforsch., Bremerhaven, Ger.)
Fette, Seifen, Anstrichmittel 58, 433-9 (1956)
Chemical Abstracts 51, 2199 (February 10, 1957)

As in the case of the herring, a good correlation exists between the fat and water content of the edible portion of the rosefish; this correlation is not influenced by the biol. state of the fish. By means of a correlation factor the fat content can be calcd. from the analytically detd. water content with an accuracy of 0.65%. With increasing total fat content the glyceride content increases slightly and the lipide content remarkably.

8.7 (Cross Reference: 1.1)

TUNA STANDARDS PROPOSED BY THE INDUSTRY

Anonymous
Pacific Fisherman 54, 20 (September 1956)

8.7 VARIATION IN PROXIMATE COMPOSITION OF RIGHT AND LEFT FILLETS OF ROCKFISH (SEBASTODES PINNIGER) AND DOVER SOLE (MICROSTOMUS PACIFICUS)

Sinnhuber, R. O.; Yu, T. C.; and Yu, Te Chang (Seafoods Laboratory, Astoria, Oregon); and Karrick, Neva L. (U. S. Fish and Wildlife Service, Seattle, Washington)
Commercial Fisheries Review 18, 24-26 (December 1956)

Individual proximate analyses were made on right and left fillets of 10 rockfish and 10 dover sole. No significant differences were found in the moisture, oil, and protein composition of the right and left fillets from these 20 individual fish.

9.13 CHEMICAL STUDIES ON THE BLOOD HEMOGLOBINS OF FISHES--I.

Matsuura, Fumio and Hashimoto, Kanchisa
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 11, 1158-1162 (1956) (English abstract, figures, and table)

Oxy- and met-hemoglobin crystals were obtained from the blood of Thunnus orientalis (immature), Katsuwonus vagans, Cyprinus carpio, and Seriola quinque-radiata and studied spectrophotometrically.

9.13 PITUITARY DEGENERATION AND ADRENAL TISSUE HYPERPLASIA IN SPAWNING PACIFIC SALMON

Robertson, O. H. (Department of Biological Sciences, Stanford University, California) and Wexler, Bernard C. (Jewish Hospital Association, Cincinnati, Ohio)
Science 125, 1295-1296 (June 28, 1957)

The nature of the death of the Pacific salmons, which occurs regularly following their initial spawning has been explained.

9.3 CANADA SETS STANDARDS FOR FISH STICKS

Anonymous
Pan American Fisherman 10, 17 (July 1956)

(Abstract of this article appears under 3.237 page 11 - February 1957)

9.3 U. S. IMPORT CLASSIFICATION & DUTIES OF FISHERY & WILDLIFE COMMODITIES

Sandberg, A. M. (Economics and Cooperative Marketing Section, Branch of Commercial Fishing, Washington, D. C.)
Fishery Leaflet 417, 35 pp. (Revised June 1957) U. S. Fish and Wildlife Service, Washington 25, D. C.

This leaflet has been prepared to provide ready reference to Schedule A, Statistical Classification of Commodities Imported into the United States, code classifications, tariff paragraphs, and rates of duties of commodities derived from fisheries and wildlife or of particular use to fisheries and wildlife.

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